United States Department of the Interior

FISH AND WILDLIFE SERVICE
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Applicant:	Florida Department of Transportation
Project:	State Road 7 Extension Project
County:	Palm Beach

Dear Mr. Sullivan:

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion for the Federal Highway Administration's (FHWA) authorization of the Florida Department of Transportation's (FDOT) construction of the State Road (SR) 7 Extension Project, and its effects on the endangered Everglade snail kite (snail kite; *Rostrhamus sociabilis plumbeus*). This Biological Opinion is written in accordance with section 7 of the Endangered Species Act of 1973, as amended in 1998 (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*). The project site is located in Section 1, Township 43 South, Range 41 East; Section 6, Township 43 South, Range 42 East; and Sections 19, 30, and 31, Township 42 South, Range 42 East, in Palm Beach County, Florida (Figure 1).

This Biological Opinion is based on information provided in the FHWA letter to the Service dated September 26, 2013; information on the project from the applicant's consultant; and meetings, telephone conversations, emails, and other sources of information. A complete administrative record of this consultation is on file at the Service's South Florida Ecological Services Office (SFESO), Vero Beach, Florida.

Consultation History

On July 26, 2005, a Service biologist met with representatives of the FDOT, the U.S. Army Corps of Engineers (Corps), the Environmental Protection Agency, the National Marine Fisheries Service (NOAA Fisheries), Palm Beach County, and the City of West Palm Beach to discuss the proposed extension of SR 7 in Palm Beach County, Florida.

On March 29, 2006, a Service biologist attended an agency workshop on the proposed extension of SR 7 at the South Florida Water Management District's (SFWMD) office in West Palm Beach, Florida.

On July, 5, 2006, the Service submitted comments on the proposed SR 7 extension project through the FDOT's Efficient Transportation Decision Making (ETDM) Process website. The Service strongly recommended that the FDOT adopt an alternative that tracked west of the Ibis Development and avoid alternatives that resulted in direct or indirect impacts to conservation lands within the City of West Palm Beach's Grassy Waters Preserve (GWP) and the Palm Beach County's Pond Cypress Natural Area (PCNA).

On November 9, 2006, a Service biologist met with representatives of the FDOT, Corps, FHWA, SFWMD, the Florida Department of Environmental Protection, the Florida Fish and Wildlife Conservation Commission, and Palm Beach County to discuss the proposed extension of SR 7 in Palm Beach County, Florida.

On January 26, 2011, a Service biologist met with representatives of the FDOT and the Corps to discuss the proposed extension of SR 7 in Palm Beach County, Florida.

On October 6, 2011, a Service biologist conducted a field inspection of the SR 7 project site with representatives of the FDOT, Corps, and NOAA Fisheries.

On October 28, 2011, representatives of the Service met with representatives of the FDOT to discuss the SR 7 extension project.

In a letter to the Service dated January 18, 2012, the FDOT determined the SR 7 extension project "may affect, but is not likely to adversely affect" the threatened eastern indigo snake (*Drymarchon couperi* = *Drymarchon corais couperi*), the endangered snail kite, and the endangered (threatened as of 2014) wood stork (*Mycteria americana*).

In a letter to the FDOT dated February 29, 2012, the Service concurred with the FDOT's determination for the eastern indigo snake. The Service also advised the FDOT that the project is likely to adversely affect the Everglade snail kite, and therefore, the Service could not concur with the FDOT's determination for the snail kite. The Service recommended the FHWA, the federal action agency for the project, request initiation of formal consultation for the snail kite in accordance with 50 CFR 402.14. The Service also informed the FDOT that we did not have enough information to provide concurrence or non-concurrence with the FDOT's determination for the wood stork, and requested additional information related to the snail kite and the wood stork needed to move forward with the consultation. In addition, the Service noted the proposed alignment for the project would result in significant adverse effects to fish and wildlife, and to public conservation lands in Palm Beach County's PCNA and the City of West Palm Beach's GWP. The Service recommended the FDOT discard the proposed alignment for the project and reinstate the "west of Ibis" alternative as the preferred alignment for the project.

On April 19, 2012, representatives of the Service met with representatives of the FDOT to discuss the SR 7 extension project.

In a letter to the Service dated July 2, 2012, the FDOT provided comments on the Service's letter to the FDOT dated February 29, 2012.

In a letter to the Service dated August 7, 2012, the FHWA transmitted additional information from the FDOT on the project, and requested the Service initiate formal consultation for the project's adverse effects on the Everglade snail kite and the wood stork.

On September 11, 2012, representatives of the Service met with representatives of the FDOT, Palm Beach County, the Corps, and the SFWMD to discuss the SR 7 extension project.

In a letter to the FHWA dated December 12, 2012, the Service restated our concerns regarding the SR 7 extension project's adverse effects to the Everglade snail kite and urged the FHWA to discard the proposed corridor for the project and adopt a new corridor that would minimize or eliminate adverse effects to the snail kite. The Service also recommended the FHWA prepare an Environmental Impact Statement (EIS) for the SR 7 extension project per requirements of the National Environmental Policy Act (NEPA).

On January 14, 2013, representatives of the Service participated in a conference call with the representatives of the FHWA to discuss the SR 7 extension project.

In a letter to the Service dated January 31, 2013, the FHWA requested the Service conclude formal consultation for the SR 7 extension project.

In a letter to the FHWA dated February 8, 2013, the Service stated that we: (1) still have serious concerns regarding the snail kite's ability to withstand the likely adverse effects of the SR 7 extension project; (2) did not believe the FDOT had proposed measures that adequately minimized the adverse effects of the project to the snail kite and, therefore, cannot yet initiate formal consultation on the project; and (3) strongly urged the FHWA to discard the proposed corridor for the project and adopt a new corridor that would minimize or eliminate adverse effects to the snail kite. The Service also stated that we believe the SR 7 extension project clearly meets the definition of a major Federal action that significantly affects the quality of the human environment, and recommended the FHWA prepare an EIS for the project per requirements of the NEPA.

In a letter to the FHWA dated February 28, 2013, the Service noted we received the FHWA's letter dated January 31, 2013. We confirmed we did not request additional information on the proposed preferred alignment for the SR 7 extension project because we felt it was not prudent to request additional information on the project prior to the scheduled September 11, 2012, meeting to discuss the project with the FHWA, FDOT, Corps, and SFWMD. At that meeting, the Service clearly stated our concerns with the proposed alignment and requested other alternatives be considered which would minimize adverse effects to the endangered snail kite and trust resources. We noted the Service reiterated these concerns in letters to the FHWA dated

December 12, 2012, and February 8, 2013, and advised the FHWA that neither of the aforementioned letters constitutes the Service's Biological Opinion nor concludes consultation on the current preferred alternative for the SR 7 extension project. We further notified the FHWA that the Service had not yet officially initiated formal consultation on the SR 7 extension project, and that we outlined specific additional information necessary to complete the consultation request and provided this to FDOT and FHWA prior to, and in anticipation of, the request for formal consultation sent on August 7, 2012. These outstanding items were reiterated at the September 11, 2012, meeting and in our February 8, 2013, letter, and had not yet been submitted. Therefore, the consultation time frames of 90 days to formulate our Biological Opinion on the project and an additional 45 days to provide the final Biological Opinion to FHWA had not yet begun.

On April 9, 2013, representatives of the Service met with representatives of the FDOT to discuss the SR 7 extension project.

In a letter to the Service dated May 23, 2013, the FHWA provided a "Conceptual Mitigation Plan" from the FDOT dated May 2013, to compensate for impacts to wetlands and minimize adverse effects to the Everglade snail kite resulting from the SR 7extension project.

On June 6, 2013, representatives of the Service met with representatives of the FDOT, FHWA, and Corps to discuss the SR 7 extension project and the "Conceptual Mitigation Plan".

In a letter to the FHWA dated June 25, 2013, the Service stated that, based on our review of the FDOT's "Conceptual Mitigation Plan", we still did not have enough information to initiate formal consultation, and requested additional information.

In a letter from the FHWA to the Service dated September 25, 2013, the FDOT provided the Service with the additional information requested for the Everglade snail kite in our June 25, 2013, letter to the FHWA.

In a letter to the FHWA dated December 13, 2013, the Service provided comments on the information provided by the FDOT in the FHWA's September 25, 2013, letter and "Conceptual Mitigation Plan." The Service indicated we still did not have enough information to initiate formal consultation, and requested additional information.

On January 14, 2014, representatives of the Service met with representatives of the FDOT to discuss the SR 7 extension project.

In a letter to the Service dated April 22, 2014, the FDOT provided a revised Conceptual Mitigation Plan for the SR 7 Extension project.

As of June 10, 2014, we received all the information necessary for initiation of formal consultation on the Everglade snail kite for this project as required in the regulations governing interagency consultations (50 CFR § 402.14). The Service is providing this Biological Opinion in conclusion of formal consultation.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The FDOT proposes to widen and extend SR 7 in Palm Beach County, Florida (Figure 1). The existing two-lane road will be enlarged to four lanes from Okeechobee Boulevard to 60th Street. In addition, a new section of four-lane road will be constructed from 60th Street to Northlake Boulevard. The proposed works include the construction of a bridge over the M-Canal and the installation of a culvert to conduct water from the Ibis residential development preserve area to the City of West Palm Beach's GWP. The proposed roadway would include paved 12-foot wide travel lanes, 2-foot wide curbs, a raised 42-foot wide center median, and a 5-foot wide sidewalk. A guard rail and fence would be installed along the east side of the roadway. Linear retention swales and linear stormwater treatment ponds would also be constructed within the project corridor. Intersections will be constructed at 60th Street and at the entrance to the Ibis Golf and Country Club residential development. The total length of the project corridor is 8.5 miles and the project will be constructed within right-of-way owned by the FDOT or Palm Beach County. The project corridor is located immediately adjacent to Public Conservation lands located at Palm Beach County's PCNA and the City of West Palm Beach's GWP (Figure 1). The purpose of the project is to provide additional roadway capacity to meet current motor vehicle traffic needs in the project area and the increase in motor vehicle traffic in the project area expected to occur from projected human population growth.

Adverse effects to the snail kite and proposed compensation

The 75.27-acre (ac)[30.46 hectare (ha)] project footprint is comprised of 0.71 ac (0.29 ha) of pine flatwoods, 0.25 ac (0.1 ha) of canal, 4.77 ac (1.93 ha) of vegetated ditches, 14.31 ac (5.79 ha) of mixed wetland shrub, 22.52 ac (9.11 ha) of hydric pine flatwood, 11.31 ac (4.58 ha) of freshwater marsh, 13.56 ac (5.49 ha) of vegetated berms, and 7.84 ac (3.17 ha) of existing road way. The Service finds the 75.27-ac [30.46 ha] project site provides 67.43 ac (27.29 ha) of habitat types suitable for Everglade snail kite feeding and nesting. All lands within the project footprint will be cleared and converted to paved roadway and drainage features. Therefore, the project will directly result in the loss of about 67.43 ac (27.29 ha) of snail kite habitat.

The project will also indirectly result in adverse effects to the snail kite. The operation of the roadway following construction increases the likelihood of injuries and mortalities to snail kites resulting from collisions with motor vehicles. More importantly, constant motor vehicle use and human activity on the completed roadway will significantly increase disturbance to snail kites in wetland habitats east of the roadway footprint. Little is known regarding the effects of roadway-related disturbance on nesting, foraging, and roosting. However, snail kites are likely to respond to the disturbance by avoiding the project area or otherwise altering their behavior. Consequently, the Service finds it likely that disturbance resulting from the project will indirectly result in the loss of habitat used by the snail kite for nesting, foraging, and roosting. The amount of habitat indirectly lost due to disturbance is difficult to quantify, as the disturbance threshold for snail kites is not well understood, but could be substantial. The Service finds habitat loss due to the direct and indirect effects of the SR 7 extension project will likely reduce the breeding success of snail kites in the project area and could contribute to snail kite mortality.

To minimize the project's adverse effects to the Everglade snail kite, the FDOT proposes to protect in perpetuity 219 ac (88.6 ha) of suitable snail kite habitat located within the "Rangeline Corridors" from Okeechobee Boulevard to the M-Canal, and Northlake Boulevard to Jupiter Farms (Figure 2). The Rangeline Corridors are FDOT owned lands within or adjacent to public conservation lands (*i.e.*, the GWP and Palm Beach County's Environmental Resource Management PCNA and Loxahatchee Slough natural areas) that were previously being considered as locations for the extension of SR 7 from Okeechobee Boulevard to Jupiter Farms. The Rangeline Corridors will be transferred to the Palm Beach County's Environmental Resource Management and placed under a conservation easement that lists the Service as having third party rights (*i.e,* the abilility to ensure the conservation easement is enforced). To provide for the long-term maintenance and management of the "Rangeline Corridors," the FDOT and/or Palm Beach County will provide a non-wasting endowment of $1,167.00 per ac for a total endowment of $255,573.00 ($1,167.00 per ac x 219 ac = $255,573.00). The endowment will be placed into an account created by the Palm Beach County Board of County Commissioners (PBCBCC) that specifically mandates the funds will be used only for activities related to maintenance and management of the Rangeline Corridors. This account will be managed by the Palm Beach County's Environmental Resources Management. Management activities within the Rangeline Corridors will follow Palm Beach County's Environmental Resource Management's plan for maintenance and management of the PCNA (Palm Beach County Environmental Resources Management, 2010).

Action area

The action area is defined as all areas to be directly or indirectly affected by the Federal action and not just the immediate area involved in the action. Therefore, the Service considers the action area for this project as all lands within the project footprint and all lands located in the PCNA and the GWP south of Northlake Boulevard (Figure 1). The action area contains about 14,400 ac (5,827 ha) of lands that are almost entirely undeveloped. Roughly 90 percent (12,500 ac [5,059 ha]) of the lands within the action area are comprised of wetlands.

FISH AND WILDLIFE RESOURCES

This section is provided to address other fish and wildlife resources in the project area.

Wildlife habitat in adjacent public conservation lands

The lands immediately east and adjacent to the SR 7 corridor are protected for conservation purposes and comprise the GWP (12,800 ac [5,180 ha]) and the PCNA (1,737 ac [702.9 ha]), (Figure 1). The GWP makes up part of the Loxahatchee Slough, the historical northern extent of the Everglades. The plant communities in these areas consist of pine flatwoods, hydric hammock, wet prairie, dome swamp, depression marsh, and strand swamp. The plant species observed include: pond-cypress (*Taxodium ascendens*), swamp bay (*Persea palustris*), cabbage palm (*Sabal palmetto*), south Florida slash pine (*Pinus elliottii* var. *densa*), cocoa plum (*Chrysobalanus icaco*), myrsine (*Myrsine cubana*), dahoon holly (*Ilex cassine*), gallberry (*Ilex glabra*), woolysheath threeawn (*Aristida lanosa*), pineland daisy (*Chaptalia dentata*), toothache grass (*Ctenium aromaticum*), flattened pipewort (*Eriocaulon compressum*), sawgrass (*Cladium*

jamaicense), spatterdock (*Nuphar lutea*), humped bladderwort (*Utricularia gibba*), and marsh fern (*Thelypteris palustris* var. *pubescens*). The GWP and the PCNA comprise a large contiguous area of undeveloped lands that are almost entirely surrounded by commercial and residential development.

The wetlands and uplands within the GWP and the PCNA currently provide valuable habitat for a diverse assemblage of fish and wildlife. The animal species known to occur within these areas include, but are not limited to: white tailed deer (*Odocoileus virginianus*), river otter (*Lutra canadensis*), bobcat (*Felis rufus*), raccoon (*Procyon lotor*), Virginia oppossum (*Didelphis viginina*), round-tailed muskrat (*Neofiber alleni*), cotton rat (*Sigmodon hispidus*), common gallinule (*Galinula galeata*), purple gallinule (*Porphyrio martinica*), mottled duck (*Anas fulvigula*), wood duck (*Aix sponsa*), sandhill crane (*Grus canadensis pratensis*), great blue heron (*Ardea herodias*), white ibis (*Eudocimus albus*), common egret (*Ardea alba*), limpkin (*Aramus guarauna*), anhinga (*Anhinga anhinga*), great horned owl (*Bubo virginianus*), barred owl (*Strix varia*), red-shouldered hawk (*Buteo lineatus*), osprey (*Pandion haliaetus*), Wilson's snipe (*Gallinago delicata*), red-winged blackbird (*Agelaius phoeniceus*), red-bellied woodpecker (*Melanerpes carolinus*), pileated woodpecker (Dryocopus pileatus), eastern phoebe (*Sayomis phoebe*), northern cardinal (*Cadinalis cardinalis*), common yellowthroat (*Geothlypis trichas*), American alligator (*Alligator mississippensis*) , Florida redbelly turtle (*Pseudemys nelsoni*), Florida softshell (*Apalone ferrox*), striped mud turtle (*Kinosternon baurii*), Florida water snake (*Nerodia fasciata pictiventris*), yellow ratsnake (*Pantherophis obsoleta*), pygmy rattlesnake (*Sisturus miliarius*), cottonmouth (*Agkistrodon piscivorus*), green anole (*Anolis carolinensis*), pig frog (*Lithobates grylio*), southern leopard frog (*Lithobates sphenocephalus*), green tree frog (Hyla cinerea), greater siren (*Siren lacertina*), two-toed amphiuma (*Amphiuma means*), large-mouth bass (*Micorpterus salmoides*), bluegill (*Lepomis macrochirus*), warmouth (*Lepomis gulosus*), Florida gar (*Lepisosteus platyrhincus*), Seminole killifish (*Fundulus seminolis*), sailfin molly (*Poecilia latipinna*), golden topminnow (*Fundulus chrysotus*), slough crayfish (*Procambarus fallax*), apple snail (*Pomacea paludosa*), and whirligig beetle (*Gyrinus* spp.) .

In addition to providing habitat for a wide variety of species, the wetlands in these areas provide water storage and treatment for the surrounding lands, and the GWP serves as part of the potable water supply for the City of West Palm Beach.

Effects of roads on wildlife

Roads have a variety of deleterious effects on wildlife. The construction of new roads and the widening of existing roads can result in the direct loss of wildlife habitat (Forman et al. 2003). Some species may avoid roadways and refuse to cross roads altogether. Therefore, roads can act as a barrier to movement that can result in fragmentation and isolation of habitat and animal populations, potentially reducing gene flow among animal populations. Collisions with motor vehicles using roadways are a significant source of mortality and injury to wildlife species. For some species, mortalities from motor vehicle collisions may be high enough to exceed natural causes of death due to predation and disease (Forman et al. 2003). Many species of wildlife are drawn to roadways, thus exacerbating vehicle-related mortalities. For example, warm pavement attracts snakes and other reptiles to bask on the roadway, dense roadside vegetation provides

forage for rodents and deer, and scavengers (*e.g.*, vultures, crows, raccoons, etc.) are often struck and killed themselves when feeding on carcasses of other road killed animals (Noss 2002). Road construction alters the hydrology of watersheds through changes in water quantity and quality, and ground water levels. Paved roads increase the amount of impervious surface in a watershed, resulting in substantial increases in peak runoff and storm discharges, and increased sedimentation that may affect fish populations (Noss 2002). Motor vehicles emit a variety of pollutants (*e.g.*, heavy metals, carbon dioxide, carbon monoxide, motor oil, lead oxide from tires, etc.) affecting the soil and vegetation, and resulting in toxic effects to animals (Noss 2002). Finally, disturbance from motor vehicle noise and motor vehicle and roadway lighting can negatively affect wildlife. Disturbance can either reduce habitat quality or result in habitat loss by causing some species to reduce use or avoid lands near the roadway (Forman et al. 2003). Motor vehicle noise also has the potential to severely disrupt the communication of species such as birds and frogs by acoustic interference or masking (van der Ree et al. 2011)

The Service is concerned the proposed SR 7 Extension project will result in significant adverse impacts to the diverse assemblage of fish and wildlife that occurs in the project footprint and adjacent lands within the PCNA and the GWP. The project will result in the direct loss of 67 ac of moderate to high quality uplands and wetlands within the project footprint. The lands to be impacted currently act as a vegetation buffer to adjacent development in the Ibis residential community. More importantly, the construction of the roadway and operation of the roadway following its completion will result in a considerable increase in disturbance to wildlife occurring in lands adjacent to the project footprint. The increase in disturbance resulting from motor vehicle noise and lights and roadway lights has the potential to result in additional habitat loss for many animal species that choose to avoid lands near the roadway. The amount of habitat loss that will result from roadway disturbance is unknown but the Service finds that it is likely to be significant. The Service also notes the GWP and PCNA are commonly used by humans for recreational uses, in particular bird watching and wildlife observation while canoeing, kayaking, and hiking. The noise from the new roadway will significantly reduce the aesthetic value of the experience of these recreational users. Finally, the presence of the new roadway increases the potential for an accidental spill of materials from vehicles using the roadway that are either noxious or toxic to wildlife. Such a spill could result in significant mortality of wildlife in the project area. As the GWP also serves as the water supply for the City of West Palm Beach, such a spill could have major ramifications on humans.

Based on the extensive adverse impacts to fish and wildlife resulting from the project, the Service does not support the alignment of the SR 7 extension as proposed. We continue to urge the FDOT to either adopt the "no build" alternative for the proposed roadway extension, or choose an alternative corridor alignment that does not impact the PCNA or GWP (such as an alignment west of the Ibis development). We also recommend the FDOT and Palm Beach County evaluate the feasibility of using mass transportation to solve this transportation issue.

National Environmental Policy Act

NEPA requires Federal agencies to prepare an EIS for major Federal actions that significantly affect the quality of the human environment. As discussed above, the Service notes the project will result in significant adverse effects to fish and wildlife and to a critically imperiled, federally

listed species: the Everglade snail kite. Moreover, the project will result in significant adverse impacts to public conservation lands with Palm Beach County's PCNA and the City of West Palm Beach's GWP. The construction and operation of a new four-lane roadway immediately adjacent to these lands will result in a substantial increase in noise and disturbance to fish and wildlife, and will impair the aesthetic values of these conservation lands for humans. Finally, the GWP provides the drinking water for the City of West Palm Beach. Consequently, a motor vehicle accident could result in a spill of contaminants, or, at worst, toxic materials into the water supply of a large human population. In conclusion, the Service believes the project clearly meets the definition of a major Federal action that significantly affects the quality of the human environment, thereby requiring an EIS through NEPA. Therefore, we strongly urge the FHWA to prepare an EIS for the project that fully addresses alternatives for the project. We also recommend the FHWA discard the current alternative, and adopt a preferred alternative that minimizes or eliminates impacts to fish and wildlife resources and public conservation lands.

STATUS OF THE SPECIES AND CRITICAL HABITAT RANGEWIDE

Species/critical habitat description

The endangered Everglade snail kite is a medium-sized raptor, with a total body length ranging from 14 inches (in) (35.56 centimeters [cm]) to 15.5 in (36.37 cm) and a wingspan ranging from 43 in (109.2 cm) to 46 in (116.8 cm)(Sykes et al. 1995). In both sexes, the tail is square-tipped and contains a distinctive white patch on the rump. The paddle-shaped wings are bowed downward or cupped when in flight (Sykes et al. 1995). Adults have red eyes and juveniles have brown eyes (Brown and Amadon 1976; Clark and Wheeler 1987). Adult males have a uniformly slate gray plumage, and the adult female plumage is brown dorsally and pale white to cream ventrally, with dark streaking on the breast and belly (Sykes et al. 1995). Immature kites are similar in appearance to adult females, but are more cinnamon-colored, with tawny or buff-colored streaking rather than brown streaking. Females are slightly larger than males, and both sexes possess a slender, curved bill.

The Everglade snail kite was listed under the Endangered Species Preservation Act in 1967 and the Endangered Species Conservation Act in 1969. The Everglade snail kite was then listed as "endangered" under the Act in 1973. Listing was warranted due to the small number of birds remaining in the population.

Critical habitat for the Everglade snail kite was designated on September 22, 1977 (Federal Register Volume 42, Number 184). About 841,635 ac (340,600 ha) of critical habitat are located within nine critical habitat units (Figure 3) that include the littoral zone of Lake Okeechobee, and portions of the Water Conservation Areas (WCA) and Everglades National Park (Table 1). In recent years, use of the originally designated critical habitat units by snail kites has decreased significantly. As discussed below, large numbers of snail kites no longer occur within Lake Okeechobee and WCA-3A. Snail kites have also been documented to use areas not originally designated as critical habitat, such as the Kissimmee Chain of Lakes (KCOL; *i.e.*, Lake Tohopekaliga, East Lake Tohopekaliga, Lake Kissimmee, Lake Hatchineha, Lake Istokpoga, and Lake Jackson) in central Florida.

Life history

Diet and Feeding: Everglade snail kites are dietary specialists that feed primarily on Florida apple snails (*Pomacea paludosa*) (Sykes 1987a; Kitchens et al. 2002, Beissinger 1990). Snail kites are also known to prey upon several species of exotic apple snails (*Pomacea* spp.) recently established within various localities in Florida (Takekawa and Beissinger 1983, Cattau et al. 2010). Several morphological adaptations aid in feeding. Long and slender toes allow snail kites to grasp snails, and deeply hooked, sharp-tipped bills are used to extract snails from their shells (Sykes et al. 1995; Beissinger 1990). Unfortunately, these adaptations make it difficult for snail kites to feed on other types of prey (Beissinger 1990). Nevertheless, prey such as musk turtles (*Sternotherus odoratus*), mud turtles (*Kinosternon* spp.), freshwater snails (*Viviparus georgianus*) crayfish (*Procambarus* spp.), black crappie (*Pomoxis nigromaculatus*), and small snakes are occasionally caught and consumed (Beissinger 1990, Sykes et al. 1995).

Everglade snail kites prefer to forage in freshwater marshes and the shallow-vegetated littoral zones along the edges of lakes where apple snails occur in relatively high abundance. Suitable foraging habitat consists of areas of clear, open water (0.6 feet [ft] [0.183 meter (m)] to 4.3 ft [1.311 m] in depth) interspersed with patches of emergent marsh vegetation less than 6.5 ft (1.981 m) in height (Sykes et al. 1995; Kitchens et al. 2002). Emergent vegetation must be tall enough to allow apple snails to reach the water surface to breathe when the oxygen concentration of the water is low. Emergent vegetation must also be sparse enough to allow snail kites to locate and capture apple snails (Kitchens et al. 2002). Plant species that commonly occur within suitable kite foraging habitat include: spike rush (*Eleocharis cellulosa*), maidencane (*Panicum hemitomon*), sawgrass (*Cladium jamaicense*), bulrush (*Scirpus* spp), cattail (*Typha* spp), white water lily (*Nymphaea odorata*), arrowhead (*Sagittaria lancifolia*), pickerel weed (*Pontederia lanceolata*), and floating heart (*Nymphoides aquatica*). Periphyton growth on the submerged substrate provides a food source for apple snails, and submergent aquatic plants, such as bladderworts (*Utricularia* spp.) and eelgrass (*Vallisneria* spp), may contribute to favorable conditions for apple snails while not preventing kites from detecting snails (Sykes et al. 1995). Prey is located from perches or while flying from about 5 ft (1.524 m) to 33 ft (10.06 m) above the water's surface (Sykes 1987a; Sykes et al. 1995). The feet are used to grasp prey items and capture of prey normally occurs while snail kites are in flight. Apple snails can be gleaned from wetland vegetation up to 6 in (15.24 cm) below the water surface. Snail kites may concentrate hunting in a specific area, returning to the same area as long as foraging conditions are favorable (Cary 1985). Using field data from 1995 to 2004, Darby et al. (2006) estimated that apple-snail densities less than 0.14 individuals per square-meter are unable to support kite foraging.

Several factors may affect snail kite foraging success. For example, too much or too little precipitation can result in the temporary or permanent loss of apple snail habitat with a concomitant reduction in apple snail numbers. Excessive precipitation, coupled with water management practices that maintain high water levels within wetlands for extended periods, can result in the death of emergent vegetation required by apple snails for successful feeding and reproduction. Conversely, apple snails may not be able to survive in wetlands that remain dry for extended periods during droughts (*i.e.*, > 12 weeks of dry conditions), and juvenile apple snails appear to be less tolerant of dry conditions than adult snails (Darby et al. 2008). Ambient

temperature also seems to affect the ability of snail kites to successfully capture apple snails. Capture rates of apple snails were documented to be higher in summer than in winter (Cary 1985), and successful captures of apple snails by snail kites were not been observed at air temperatures less than 10°C (50°F).

Breeding and Reproduction: The breeding season of the Everglade snail kite in Florida varies from year to year and is probably affected by rainfall and water levels (Sykes et al. 1995). Nesting usually occurs from December through July, although eggs can be laid as early as August and as late as November (Sykes 1987c; Beissinger 1988; Snyder et al. 1989). Sykes (1987 c) reported about 80 percent of observed egg clutches were laid from January through April. Snail kites will often re-nest following either the successful rearing of a clutch or a failed nesting attempt (Beissinger 1986; Snyder et al. 1989). However, the mean number of clutches produced by an individual female snail kite per breeding season has not been determined (Sykes et al. 1995).

The chronology of snail kite nesting is described as follows. Pair bonds are established prior to egg-laying and typically last from nest initiation through most of the nestling stage (Beissinger 1986; Sykes et al. 1995). Male snail kites select nest sites and conduct most nest-building, a behavior likely related to courtship (Sykes 1987c; Sykes et al. 1995). Unlike most raptors, snail kites do not defend large territories and frequently nest in loose colonies or in association with wading bird nesting colonies (Sykes 1987b; Sykes et al. 1995). Kites actively defend small territories extending about 4 miles around the nest (Sykes 1987b). Copulation may occur from the early stages of nest construction, through egg-laying, and during early incubation if the clutch is not complete. Egg-laying usually begins soon after completion of the nest, but may be delayed a week or more (Sykes 1987c). The clutch size ranges from one to six eggs, with three eggs being most frequent (Sykes 1987c; Beissinger 1988; Snyder et al. 1989). Following deposition of the first egg, the remaining eggs in the clutch are laid approximately every 2 days thereafter, and the laying of a 3-egg clutch is completed in about 6 days (Sykes et al. 1995). Incubation may begin after the first egg is laid, but generally commences after the second egg is laid (Sykes 1987c). In Florida, the incubation period lasts 24 to 30 days (Sykes 1987c). Incubation of eggs is conducted by both sexes, but the amount of time spent incubating among the male and female is variable (Beissinger 1987). Hatching success varies from year-to-year and among nesting localities, but generally averages about 2.3 chicks per nest (Sykes 1987c). After hatching, both parents participate in feeding young (Beissinger 1987). Fledging occurs about 23 to 34 days following hatching and fledging dates vary about 5 days among chicks (Sykes et al. 1995). Following fledging, young are fed by one or both adults until they are 9 to 11 weeks old (Beissinger 1987). In total, snail kites have a nesting cycle that lasts about 4 months from initiation of nest-building through independence of young (Beissinger 1986; Sykes et al. 1995).

Snail kites in Florida exhibit a mating system known as "ambisexual mate desertion." The male or female snail kite may abandon the nest during the nestling stage (Beissinger 1986, 1987). This behavior usually occurs when prey is abundant, and it may be an adaptation to maximize productivity during favorable conditions. Following abandonment, the remaining parent continues to feed and attend chicks through independence (Beissinger 1986). Abandoning birds presumably form a pair bond with another snail kite and initiate a new nesting attempt. Snail

kites mature early compared with many other raptors and can breed successfully the first spring after they hatch at about 8 to 10 months old. However, not all kites breed at this age. Bennett et al. (1998a) reported that all 23 adults greater than 1 year of age tracked during their study attempted to breed while only 3 out of 9 of tracked snail kites less than 1 year of age attempted to breed. Of the 23 adult kites, 15 attempted to breed once, 7 attempted to breed twice, and 1 individual attempted to breed 3 times. Only one adult kite successfully fledged two clutches (Bennett et al. 1998a). Adult kites generally attempt to breed every year except during drought years (Sykes et al. 1995).

Nests are built almost exclusively over water in order to deter predation (Sykes 1987b). The snail kite's nest is a large (28 cm to 58 cm in diameter), loosely woven structure of dry sticks and other dry plant materials that is elongate to globose in shape, flat rimmed, and open at the top (Bessinger 1987, Sykes 1987b). Suitable nest sites consist of a single tree, shrubs, or small clumps of trees and shrubs within or adjacent to an extensive area of suitable foraging habitat. Trees used for nesting are usually less than 32 ft (9.754 m) tall and include willow (*Salix* spp.), bald cypress (*Taxodium distichum*), pond cypress (*Taxodium ascendens*), melalueca (*Melaleuca quinquenervia)*, sweetbay (*Magnolia virginiana*), swamp bay (*Persea borbonia*), pond apple (*Annona glabra*), and dahoon holly (*Ilex cassine*). Shrubs used for nesting include wax myrtle (*Myrica cerifera*), cocoplum (*Chrysobalanus icaco*), buttonbush (*Cephalanthus occidentalis*), *Sesbania* sp, elderberry (*Sambucus simpsonii*), and Brazilian pepper (*Schinus terebinthifolius*). Nesting also can occur in herbaceous vegetation, such as sawgrass, cattail, bulrush, and reed (*Phragmites australis*) (Sykes et al. 1995). Nests are often observed in herbaceous vegetation in the littoral zones of Lake Kissimmee and Lake Okeechobee during periods of low water, when dry conditions beneath the willow stands prevent snail kites from nesting in woody vegetation. However, nests constructed in herbaceous vegetation are more vulnerable to collapse from wind and wave action, and are more likely to be exposed to disturbance by humans (Chandler and Anderson 1974; Sykes and Chandler 1974; Sykes 1987b; Beissinger 1986, 1988; Snyder et al. 1989).

Longevity, Survival and Mortality: The maximum life span of the snail kite in the wild ranges from 9 years (Beissinger 1986) to 17 years (Bennetts and Kitchens, 1993). Sykes et al. (1995) observed 22 snail kites in the wild that were $\geq$ 13 years of age, and this finding indicates that snail kites may commonly live to least 13 years in the wild. Adult snail kites have high annual survival rates (*i.e.*, 85 to 98 percent of the snail kite population normally persists) (Nichols et al. 1980; Bennetts et al. 1999; Martin et al. 2006, Cattau et al. 2009), although adult survival is probably reduced in drought years (Takekawa and Beissinger 1989; Martin et al. 2006). Little information exists regarding predators of the snail kite. Mortality due to predation is likely uncommon for adult snail kites, although great horned owls, bald eagles, bobcats, foxes are capable of capturing and killing a snail kite if given the opportunity. Potential predators of eggs and nestling snail kites include raccoons (*Procyon lotor*) and rat snakes (*Pantherophis* spp.).

Movements: Snail kites are considered nomadic, and this behavior likely occurs in response to changing hydrologic conditions (Sykes 1979). During the breeding season, kites remain close to their nest sites until the young fledge or the nest fails. Following fledging, adults may remain near the nest for several weeks until the young are fully independent. Outside of the breeding season, snail kites regularly travel long distances (> 150 miles [241 km] in some cases) within

and among wetland systems in southern Florida (Bennetts and Kitchens 1997). Most movements are likely searches for more suitable foraging sites in response to droughts or other unfavorable environmental conditions. However, kites may also move away from wetlands when conditions are seemingly favorable. Currently, there is no evidence suggesting that snail kites undertake trans-oceanic movements (*e.g.*, Florida to Cuba) and interbreed and with snail kites located in other countries (Sykes 1979; Beissinger et al. 1983).

Communal Roosting: Snail kites are gregarious outside of the breeding season and may roost in groups of up to 400 or more individuals (Bennetts et al. 1994). Roosting sites are usually located over water. In Florida, communal roosts have been documented primarily in stands of willows, and in some cases melaleuca and pond cypress. Sykes (1985) found snail kites roosting in willows use stand sizes ranging from 0.05 ac (0.2023 ha) to 12.35 ac (4.998 ha), and roost at heights ranging from 5.9 ft (1.798 m) to 20.0 ft (60.96 m). Roosts observed in melaleuca or pond cypress stands occurred in tree heights ranging from 13 ft (3.962 m) to 40 ft (12.19 m) (Sykes 1985).

Population dynamics

Population Size: Historically, the Everglade snail kite was abundant in the wetlands and marshes of central and southern Florida. Several authors (Nicholson 1926; Howell 1932; Bent 1937) reported that groups of up to 100 birds were commonly observed. A decline in the snail kite population occurred during the 1940s and 1950s, and surveys suggested that as few as 6 to 100 individuals remained (Sykes 1979). In 1965, only 10 birds were observed (8 in WCA-2A, and 2 at Lake Okeechobee). The population size of the Everglade snail kite was thought to be extremely small when the species was listed as endangered in 1967, and a survey during that year documented only 21 individuals in WCA-2A (Stieglitz and Thompson 1967).

The reported decline of the Everglade snail kite population has been well documented in the literature (Beissinger 1986; Beissinger 1995; Martin et al. 2006; Cattau et al. 2008). However, it is unclear whether the observed decline in the snail kite population discussed above was entirely due to a decrease in snail kite numbers or in part an artifact of the survey effort. Historically, researchers were not aware snail kites moved in response to unfavorable hydrologic conditions (Sykes 1979), and it is possible surveys documented the absence of snail kites from their expected locations, including Lake Okeechobee and the headwaters of the St. John's marsh (Sykes 1979), rather than an actual reduction of the snail kite's population throughout its range. In addition, limited resources were available at that time for researchers to survey other potential snail kite habitats. As such, the resulting low level of survey effort may have biased the snail kite population estimates to some extent. Rodgers et al. (1988) stated it is unknown whether decreases in reported snail kite numbers in the annual surveys were due to mortality, dispersal into areas not surveyed, decreased productivity, or a combination of these factors. However, based on the significant loss of wetland habitats and range reduction that occurred prior to listing, the snail kite was unequivocally endangered at the time of its listing.

Other sources of variability existed in the past survey effort for the snail kite. Prior to 1969, the snail kite population was monitored only through sporadic and inconsistent surveys (Sykes 1979, 1984). However, an annual quasi-systematic mid-winter count of snail kites was conducted from

1969 to 1994 (Sykes 1979; Sykes 1983a; Beissinger 1986; Bennetts et al. 1999), and the number of snail kites observed ranged from 65 snail kites in 1972 to 996 snail kites in 1994. Bennetts et al. (1993, 1994) noted the 1993 and 1994 counts included many snail kites that were birds radio-tagged, and this likely increased the total count because these individuals could be easily located and often led researchers to roosts that had not been previously surveyed. Bennetts et al. (1999) analyzed the sources of variation in the count surveys and determined count totals were influenced by differences in observers, survey effort, hydrologic conditions, and site effects. Bennetts and Kitchens (1997) recommended data from count surveys not be used for snail kite population estimates or used to infer demographic parameters such as survival or recruitment. Although significant sources of error were identified in the count survey method, count data can still provide a crude indication of snail kite population trends if all influences of detection rates had been adequately taken into account. The sources of variation in the counts should be recognized prior to using these data in subsequent interpretations, especially in attempting to determine population viability and the risk of extinction.

Beginning in 1997, population estimates for the Everglade snail kite were generated using a mark-recapture method that incorporated detection probabilities (Drietz et al. 2002). This method of population estimation increases the validity of comparing population estimates among years because it allows for the determination of confidence intervals. Estimates of the snail kite population in Florida from 1997 through 2012 from Cattau et al. (2012) are presented in Figure 4. From 1997 through 1999, the snail kite population contained approximately 3,000 birds (Dreitz et al. 2002). From 1999 through 2003, the snail kite population declined each year to about 1,400 birds in 2002 and 2003, and increased slightly to about 1,700 birds in 2004 and 2005 (Martin et al. 2006). The snail kite population exhibited another steep decline during 2007, 2008, and 2009 with estimates of 1,204, 685, and 662 birds. A slight increase in the snail kite number were observed in 2010, 2011, and 2012 with estimates of 826, 925, and about 1,218 birds, respectively (Cattau et al. 2012). The estimated snail kite population in 2013 dropped slightly to 1,198 individuals. At this time, an estimate of the snail kite population for 2014 is not available.

Snail kite numbers are thought to be influenced by environmental conditions (*e.g.*, rainfall, drought, water management practices etc.) that affect their wetland habitats (Sykes 1979; Beissinger 1989, 1995; Sykes et al. 1995). Environmental conditions directly affect the hydrologic conditions of wetlands and ultimately the productivity and availability of the apple snail, the primary food source of the snail kite. Therefore, changes in hydrology that affect the survival and productivity of the apple snail, and their availability to snail kites, have a direct effect on the survival and productivity of the snail kite (Mooij et al. 2002). Beissinger (1986) reported that under favorable environmental conditions snail kites exhibit higher reproductive rates (Beissinger 1986) and juvenile survival rates.

As indicated above, a significant overall decrease in the snail kite population was observed from the late 1990s to the present (Figure 4). The population of the Everglade snail kite decreased by more than half from about 3000 birds in 1996 through 1998 to about 1,198 birds in 2013. The observed declines in the snail kite population from 1999 to 2003 coincided with a regional drought that affected central and south Florida during 2000 to 2001. During this period, nest success and juvenile survival estimated using mark-recapture methods was generally low (Martin

et al. 2006). Adult survival also declined during 2000 and 2001 (Figure 5) (Martin et al. 2006). A slight increase in the snail kite population was observed from 2004 through 2006 and this coincided with the improved hydrological conditions and more favorable nesting conditions that were observed from 2002 through 2006. Snail kite numbers again dropped in 2007 and 2008 and coincided with a serve drought 2007. The overall drop in snail kite numbers cannot be attributed entirely to adverse environmental conditions. Environmental conditions of wetland habitats during this time varied from drought to periods of normal or above normal precipitation that resulted in conditions favorable for snail kite feeding and reproduction. Consequently, the reasons for the recent decrease in the snail kite population remain unclear. However, recent studies suggest low recruitment of young and a decline in the apple snail population as factors in the decline (Cattau et al. 2008). The 2013 population estimate (1,198) indicates the snail kite population is currently precariously small and highly endangered.

Population viability: Populaton Viability Analysis (PVA) is a statistical modelling technique that uses ecological and demographic parameters to estimate the probability that a population of a species will become extinct within a given number of years. A PVA was conducted for the Everglade snail kite population in Florida in 2010 (Cattau et al. 2012). The results of the PVA predict a 95 percent probability that the snail kite population will become extinct within the next 40 years. Cattau et al. (2012) noted that the results of the PVA are especially concerning because they indicate an increased risk of extinction when compared to results of a previous PVA conducted in 2006.

Status and distribution

The Everglade snail kite (*R. sociabilis plumbeus*) is one of three subspecies of snail kites that occur primarily in lowland freshwater marshes from Florida, Cuba, and Mexico south through portions of Central and South America to northern Argentina. The range of the Everglade snail kite is limited to Florida in the United States of America, and portions of Cuba including Isla de la Juventud.

In Florida, the historic range of the snail kite was larger than its current range and snail kites were known to occur from the southern tip of the Florida peninsula to as far north as Crescent Lake and Lake Panasoffke in north-central Florida and as far west as the Wakulla River (Howell 1932; Sykes 1984). The current distribution of the snail kite in Florida is limited to freshwater ecosystems within the central and southern portions of the State. Important areas currently utilized by the snail kite include: the Upper St. Johns marshes, KCOL, Lake Okeechobee, Loxahatchee Slough, the Everglades, and the Big Cypress basin, the East Orlando Wilderness Park, the Blue Cypress Water Management Area, the St. Johns Reservoir, and the Cloud Lake, Strazzulla, and Indrio impoundments, and the Blue Cypress Water Management Area (Beissinger and Takekawa 1983; Sykes 1984; Rodgers et al. 1988; Bennetts and Kitchens 1992; Rumbold and Mihalik 1994; Sykes et al. 1995; Martin et al. 2005 and 2006).

Historically, the extensive littoral marshes of Lake Okeechobee located within Fisheating Bay and near the inflow of the Kissimmee River were used by snail kites for foraging and nesting (Martin et al. 2006). However, a significant decline in foraging and nesting occurred from 1996 through 2006, and Lake Okeechobee made only minor contributions to the snail kite population

during this time (Cattau et al. 2008). The reduction in foraging and nesting has been attributed to habitat degradation resulting from the hurricanes that occurred during 2004 (Cattau et al. 2008) and the water management practices that occurred during this time period (Bennetts and Kitchens 1997). Water management actions have resulted in more water being retained in the lake with a concomitant increase in water levels. High water levels in the 1990s resulted in a significant loss of emergent herbaceous and woody vegetation in Lake Okeechobee's emergent wetlands. The loss of emergent vegetation reduced the abundance of apple snails (the snail kite's chief prey item) because snails require emergent vegetation for feeding and egg-laying. The reduction of trees and shrubs in the littoral zone has reduced nesting and perching sites available to the snail kite. Drought conditions from 2006 through 2008 also made much of the habitat in the Lake Okeechobee's littoral zone unsuitable for snail kite nesting and foraging. Nesting was not been observed from 2007 to 2009 and only limited nesting was documented in 2010 within portions of the lake located outside of the historic nesting areas (*i.e.*, emergent marsh located near the Kissimmee River, Eagle Bay Island, and Observation Island).

During the last few years (2011 to present) lower water levels have been observed within Lake Okeechobee and snail kite nesting has increased. In 2011, there were 39 nest attempts and 16 successful nests producing 26 nestlings. Nesting increased in 2012, with 76 nest attempts and 23 successful nests producing 43 nestlings. Okeechobee accounted for 25 percent of the range-wide nesting effort and produced 21 percent of the fledglings in 2012 (Cattau et al. 2012). Data have not yet been verified for 2013, but indications are that nesting attempts and success were similar to of 2012. The increase in snail kite nesting over the last few years is correlated with an increase in the exotic apple snail population of Lake Okeechobee. However, the long-term effects of exotic snails on the snail kite population is unclear

The Everglades, specifically WCA-3A, is another formerly productive snail kite habitat that has experienced reduced use by kites in recent years (Cattau et al. 2009). Snail kite reproduction decreased significantly after 1998 and successful reproduction was not documented in WCA-3A during 2001, 2005, 2007, 2008, and 2010. In 2012, only one successful nest that fledged one young was observed. As discussed for Lake Okeechobee, current water management practices in the WCAs are also thought to have degraded habitat quality for the snail kite. In 2013, an increase in snail kite nesting within WCA-3A was documented with 68 nesting attempts producing 18 successful nests and 27 fledged young. It is unclear at this time whether this represents the beginning of a long-term trend of increased nesting in WCA-3A or merely an outlier due to favorable hydrologic and climatic conditions experienced during 2013. An increase in exotic apple snail abundance in lower WCA-3A may also be affecting snail kite nesting in WCA-3A.

Because of the habitat degradation in Lake Okeechobee and WCA-3, snail kites have recently focused much of their foraging and breeding activities within the KCOL (Cattau et al. 2009) in central Florida. The KCOL now supports the greatest number of snail kites in Florida and accounted for 52, 12, 89, 72, and 61 percent of the successful nesting attempts range-wide in 2005 through 2009, respectively (Cattau et al. 2009). Lake Tohopekaliga accounted for 41 percent of all successful nests and 57 percent of all fledged young that were documented on a range-wide basis from 2005-2010. In 2012, Lake Tohopekaliga accounted for 25 percent and

24 percent of all successful nests and fledged young, respectively. Additionally, in 2011 and 2012, East Lake Tohopekaliga, accounted for 27 percent and 30 percent of all successful nests and fledged young, respectively. A small number of nests have also been documented on Lake Hatchineha, Lake Istokpoga, and Lake Jackson within recent years.

Other localities providing suitable snail kite habitat include the Loxahatchee Slough region of Palm Beach County. Snail kites have been documented in the Loxahatchee National Wildlife Refuge (also known as WCA-1) and throughout the remaining marshes in the vicinity including the City of West Palm Beach's GWP. Snail kites may occur within nearly all remaining wetlands of the Everglades region, with recent nesting occurring within WCA-2B, WCA-3A, WCA-3B, and Everglades National Park (ENP) (Martin et al. 2006). Within the Big Cypress basin, snail kites may occur within most of the non-forested and sparsely forested wetlands. Although nesting has not been regularly documented in this area in recent years, some nesting likely occurs.

In addition to the areas discussed above, there are numerous records of snail kite occurrences and nesting within isolated wetlands throughout its current range. In the 1990's, Sykes et al. (1995) observed snail kites using smaller, more isolated wetlands including the Savannas State Preserve in St. Lucie County, Hancock Impoundment in Hendry County, and Lehigh Acres in Lee County. Takekawa and Beissinger (1989) identified 35 areas consisting of lakes, canals and marsh in Alachua, Duval, Glades, Hendry, Indian River, Lake, Martin, Miami-Dade, Okeechobee, Osceola, Palm Beach, and Volusia counties they considered drought refugia that may provide kite foraging habitat when conditions in the larger more traditionally occupied wetlands are unsuitable. Radio tracking of snail kites has also revealed that the network of habitats used by the species includes many smaller, widely dispersed wetlands within this overall range (Bennetts and Kitchens 1997). Snail kites may use nearly any wetland within southern Florida under some conditions and during some portions of their life history. For example, 2010 snail kite nesting surveys documented nesting in surprisingly high numbers in peripheral areas such as Harns Marsh, in Lehigh Acres, and Stormwater Treatment Area 5 in Hendry County. A kite nest and juveniles were also observed for the first time in the S-332D detention area in eastern ENP, also known as the Frog Pond.

Threats to the species

There are a variety of threats that can affect nesting, foraging, and survival of the Everglade snail kite. Threats include loss and degradation of wetland habitats, changes in hydrologic conditions, and impacts to the prey base.

The principal threat to the snail kite is the loss, fragmentation, and degradation of wetlands in central and southern Florida resulting from urbanized and agricultural development and alterations to wetland hydrology through ditching, impoundment, and water level management. Nearly half of the Everglades have been drained for agriculture and urban development (Davis and Ogden 1994; Corps 1999). The Everglades Agricultural Area (EAA) alone eliminated 3,100 square-miles of the original Everglades and the urban areas in Miami-Dade, Broward, and Palm Beach Counties have contributed to the reduction of habitat. North of ENP the remaining marsh has been fragmented into shallow impoundments (*i.e.*, WCAs).

The Corps' Central and Southern Florida (CS&F) Project encompasses 18,000 square-miles from Orlando to Florida Bay and includes about 994 miles each of canals and levees, 150 water control structures, and 16 major pump stations. This system, originally designed and constructed for flood control and water supply, has disrupted the volume, timing, direction, and velocity of freshwater flow and has resulted in habitat loss and degradation in the WCAs and other portions of the historic Everglades. Drainage of Florida's interior wetlands has reduced the extent and quality of habitat for both the apple snail and the snail kite (Sykes 1983b). Widespread drainage has permanently lowered the water table in some areas and permitted development in areas that were once snail kite habitat.

Habitat loss and fragmentation are also factors influencing the snail kite's survival during droughts, despite the species' dispersal ability (Martin et al. 2006). As was discussed previously, the snail kite may use almost any wetland within southern Florida during some portion of its life. In dry years, snail kites depend on water bodies that are suboptimal and not normally used for feeding, such as canals, impoundments, or small marshes (Beissinger and Takekawa 1983; Bennetts et al. 1988; Takekawa and Beissinger 1989). The fragmentation or loss of wetland habitat significantly limits the snail kites' ability to be resilient to disturbance such as droughts. As wetland habitats become more fragmented, the dispersal distances for snail kites become greater and increase stress on dispersing kites that may not be able to replenish energy supplies.

Degradation of the water quality of wetland habitats through runoff of phosphorus and nitrogen from agricultural and urban sources (cultural eutrophication) can adversely affect the snail kite by altering the composition and structure of wetland plant communities. Nutrient enrichment leads to growth of dense stands of emergent (*e.g.*, cattail), and floating vegetation (primarily water hyacinth [*Eichhornia crassipes*] and water lettuce [*Pistia stratiotes*]) that limit the ability of snail kites to find prey and effectively forage within the wetland (Service 2007a). The Everglades was historically an oligotrophic system, but major portions have become eutrophic due to storm water runoff from agricultural lands north of Lake Okeechobee, and adjacent to the Kissimmee River, Taylor Slough, and Nubbin Slough (Federico et al. 1981). Cultural eutrophication also is also occurring in limnetic environments such as the KCOL. Appropriate regulation of water levels in lakes and the WCAs is particularly important to maintain the types of vegetative communities that provide suitable habitat for the snail kite.

The management of wetland plant communities can have adverse effects on snail kites. Attempts to control, reduce, and eliminate invasive (*e.g.*, cattail and bulrush) and exotic plant species through mechanical removal and spraying by government agencies has resulted in the destruction of snail kite nests (Rodgers et al. 2001) and the loss of apple snail habitat. Nonetheless, impacts to snail kite nesting habitat and apple snails from vegetation management activities in Lake Okeechobee and the KCOL have been greatly reduced through improved communication and cooperation between the Service and agencies undertaking vegetation management actions. The Service has also expanded our efforts to notify aquatic plant management agencies of the locations of active snail kite nests (Service 2006) to assist them in avoiding these sites during the snail kite nesting season.

Past management of water levels in WCAs and Lake Okeechobee has had adverse effects on snail kite nesting, foraging, and ultimately the population size of the snail kite (Sykes 1983a; Beissinger and Takekawa 1983; Beissinger 1986; Dreitz et al. 2002; Martin et al. 2007; Cattau et al. 2008). Storage of water in these areas has increased water levels and hydroperiods. Consequently, large sections of the WCAs have been converted from wet prairie habitats to slough-type habitats, and herbaceous and woody vegetation within the littoral areas of Lake Okeechobee has been eliminated or reduced significantly. Changes in vegetation have: (1) reduced apple snail populations that the snail kite relies upon for food (Darby et al., 2006); (2) reduced the snail kites' ability to forage and nest; and (3) and reduced the availability of woody plants that snail kites uses for nesting and perching. The maintenance of appropriate seasonal water levels is needed to restore snail kite habitat within Lake Okeechobee and the WCAs. The recovery of the snail kite is unlikely without the restoration of habitat in these areas.

Additional potential threats to snail kites include exposure to bioaccumulated contaminants in their prey, the proliferation of exotic snails, and naturally occurring but extreme weather conditions. Copper, used in fungicide applications and commonly found in disturbed areas of Everglades wetlands, has been shown to accumulate in the tissues of apple snails and may lead to birth defects in snail kite nestlings (Frakes et al. 2008). Uptake of copper through sediments and diet has been demonstrated, with uptake from the latter as the primary exposure route for the Florida apple snail (Frakes et al. 2008; Hoang et al. 2008a). The ability of Florida apple snails to bioaccumulate copper has implications for the survival and recruitment of the Florida apple snail and its predator, the snail kite. However, there is still uncertainty regarding the amount of copper that is actually ingested and accumulated by snail kites. The areas of greatest concern are the stormwater treatment areas and water reservoirs created in association with Everglades restoration projects. Additional information on Florida apple snail bioaccumulation of copper, copper availability, and average exposure patterns of snail kites under various environmental conditions may be necessary to identify the risk to the snail kite posed by these contaminants.

In addition to concerns regarding low abundances of native Florida apple snails, the introduction of exotic apple snails (*Pomacea* spp.) may adversely affect the survival of the snail kite, most notably through decreased juvenile recruitment. Snail kites, limpkins (*Aramus guarauna*), and other predators have been observed eating the exotic island apple snail, although young kites have difficulty handling mature exotic snails due to their large size (Cattau et al. 2010). The snail kite may be relatively well-adapted to capture and consume non-native *Pomacea* species, but preliminary information suggests that snail kites may only be able to successfully extract the flesh from a small portion of the exotic snail *P. haustrom* due to its large size. Cattau et al. (2010) documented that the consumption rate of the exotic snails versus native snails was significantly lower, and that juvenile snail kites experienced a lower net daily energy intake when feeding on exotic snails. As such, juvenile kites that are reliant on these non-native snails may not be able to sustain themselves, despite the fact that snails are abundant (Cattau et al. 2010). Further research is needed to determine the effects of exotic apple snails on juvenile snail kites and the snail kite population (SEI 2007 a,b).

Finally, inclement weather conditions can affect snail kite nesting success and survival. Wind storms have caused toppling of nests, particularly on Lake Okeechobee and Lake Kissimmee due

to the long wind fetch across these large lakes. Cold ambient temperatures can also produce nest failure, either through decreased availability of apple snails or mortality of young due to exposure. Abandonment of nests before egg-laying is also common, particularly during drought or following passage of a cold front.

Additional information on the Everglade snail kite is available in the MSRP (Service 1999) and the 5-year review (Service 2007a) located at http://www.fws.gov/verobeach/ListedSpeciesBirds.html; follow the link for ECOS – Everglade snail kite.

Analysis of the species likely to be affected

Everglade snail kite

The Everglade snail kite is an endangered raptor that occurs in wetlands of central and southern Florida. Everglade snail kites are dietary specialists that feed primarily on Florida apple snails. Loss and degradation of wetlands in central and southern Florida resulting from residential, commercial, and agricultural development, and alterations to wetland hydrology through ditching, and impoundment and water level management have adversely affected the snail kite and its primary prey item, the apple snail. Other threats to the species include water quality degradation, wetland plant management practices, the bioaccumulation of contaminants, and the introduction of exotic apple snails.

The FHWA determined the SR 7 extension project "may affect and is not likely to adversely affect" the Everglade snail kite. In a letter to the FDOT (the FHWA's designated Federal representative) dated February 29, 2012, the Service advised the FDOT that we find the project is likely to adversely affect the Everglade snail kite, and therefore, could not concur with the FDOT's determination for the snail kite. The Service recommended the FHWA, the Federal action agency for the project, request initiation of formal consultation for the Everglades snail kite in accordance with 50 CFR 402.14. In a letter to the Service dated August 7, 2012, the FHWA requested the Service initiate formal consultation for the project's adverse effects on the Everglade snail kite. The project's adverse effects to the Everglade snail kite will be discussed in the remainder of this Biological Opinion. Critical habitat for the Everglade snail kite will not be affected by the project.

Eastern indigo snake and wood stork

Additional federally listed species may occur within the SR 7 Extension project area. In a letter to the Service dated January 18, 2012, the FDOT, the FHWA's designated Federal representative, determined the project "may affect, but is not likely to adversely affect" the threatened eastern indigo snake and the endangered (now threatened) wood stork. During construction, the FDOT will follow the Service's *Standard Protection Measures for the Eastern Indigo Snake* (Service 2013), to minimize adverse effects to this species. Based on these protection measures, the Service provided concurrence for the FDOT's determination for the eastern indigo snake through our letter to the FDOT dated February 29, 2012. Critical habitat has not been designated for the eastern indigo snake and will not be affected.

The SR 7 Extension project site is located within the core foraging area (within 18.6 miles) of two active wood stork breeding colonies. The project will result in the loss of 53.17 ac (21.52 ha) of long-hydroperiod (inundated > 180 days per year) wetlands that may provide foraging habitat for the wood stork. Through application of the Service's wood stork forage methodology, the FDOT's consultant has determined the 53.17 ac (221.52 ha) of long-hydroperiod wetlands lost due to the project provide 136.52 kilograms (kg) of forage biomass. To compensate for the loss of wood stork forage biomass, the applicant has proposed to acquire at least 136.52 kg of wood stork biomass from the Pine Glades North Mitigation Area. In a letter to the Service dated August 7, 2012, the FHWA requested the Service initiate formal consultation for the SR 7 Extension project affects to the wood stork. However, a determination of the project's effects on the wood stork was not provided by the FHWA in their letter. Based on the minor impacts to wood stork foraging habitat, the Service finds the project "may affect, but is not likely to adversely affect" the wood stork. Accordingly, we recommend the FHWA adopt a determination of "may affect, not likely to adversely affect." This letter can be used as concurrence of this finding. Critical habitat has not been designated for the wood stork and will not be affected.

As discussed above, the Service concurs that the SR 7 extension project is not likely to adversely affect the eastern indigo snake and the wood stork. Therefore, these species will not be considered further in this Biological Opinion.

ENVIRONMENTAL BASELINE

As defined in Service regulations, "the environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process."

In addition, under the Act's regulatory approach, future Federal actions are not included in either the environmental baseline or the cumulative effects analysis of a biological opinion, because they will be subjected to consultation when they occur. See 51 Fed. Reg. 19,926, 19,933 (June 3, 1986) (preamble to FWS consultation regulations).

Therefore, for our assessment, the environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions that occur simultaneously with the consultation in progress.

Climate change

Climate change is evident from observations of increases in average global air and ocean temperatures, widespread melting of snow and ice, and rising sea level, according to the Intergovernmental Panel on Climate Change (IPCC) (IPCC 2007). The IPCC Report describes natural ecosystem changes with potential wide-spread effects on organisms from marine

mammals to migratory birds. The potential for rapid climate change poses a significant challenge for fish and wildlife conservation. Species' abundance and distribution are dynamic, relative to a variety of factors, including climate. As climate changes, the abundance and distribution of fish and wildlife will also change. Highly specialized or endemic species are likely to be most susceptible to the stresses of changing climate. Based on these findings and other similar studies, the Department of the Interior requires agencies under its direction to consider potential climate change effects as part of their long-range planning activities (Service 2007b).

Climate change at the global level drives changes in weather at the regional level, though weather is also strongly affected by season and by local factors, such as elevation, topography, latitude, and proximity to the ocean. Temperatures are predicted to rise from 2°C to 5°C for North America by the end of this century (IPCC 2007). Other processes to be affected by this projected warming include rainfall (amount, seasonal timing and distribution), storms (frequency and intensity), and sea level rise. However, the exact magnitude, direction and distribution of these changes at the regional level are not well understood or easy to predict. Seasonal change and local geography make prediction of the effects of climate change at any location variable. Current predictive models offer a wide range of predicted changes.

Prior to the 2007 IPCC Report, Titus and Narayanan (1995) modeled the probability of sea level rise based on global warming. They estimated the increase in global temperatures could likely raise sea level 6 inches by 2050 and 13 inches by 2100. While these estimates are lower than the estimates described in the IPCC Report (2007), Titus and Narayanan's (1995) modeling efforts developed probability-based projections that can be added to local tide-gauge trends to estimate future sea level at specific locations.

Climatic changes in south Florida could exacerbate current land management challenges involving habitat fragmentation, urbanization, invasive species, disease, parasites, and water management (Pearlstine 2008). The effects of global warming on endangered, threatened, and other "at risk" species will be a difficult to determine. The Service will use Strategic Habitat Conservation planning, an adaptive science-driven process that begins with explicit trust resource population objectives, as the framework for adjusting our management strategies in response to climate change (Service 2007b).

Status of the species within the action area

As stated previously, the action area is defined as all areas to be directly or indirectly affected by the Federal action and not just the immediate area involved in the action. For the purposes of this consultation, the action area includes the project footprint and all lands located in the City of West Palm Beach's GWP south of North Lake Boulevard and Palm Beach County's PCNA (Figure 1). The action area does not contain designated critical habitat for the Everglade snail kite.

Snail kites are known to forage and nest within the action area. Historically, significant use of the action area has occurred. Over 200 kites used a roost (a large patch of willow and other trees) bordering the GWP in 1989 (Takekawa and Beissinger, 1989) and likely foraged within GWP. The actual number of snail kites using the action area on an annual basis is not known.

Therefore, the Service used recent data on snail kite nesting collected from the GWP by the University of Florida's Florida Cooperative Research Unit as an indicator of the relative abundance of the snail kite in the action area. A total of 16 nests were observed in 2005 and nesting effort was reduced in 2006 with only 4 nests observed. Snail kite nests were not observed during 2007, 2008, and 2009. In 2010, 11 nests were observed and nesting declined in 2011 and 2012 with 6 nests and 1 nest observed, respectively. Two snail kite nests were constructed in the GWP during 2013, unfortunately both nests failed to produce young. Early reports from the GWP for the 2014 nesting season indicate that one active snail kite nest containing two nestlings has been observed northeast of the M-Canal and within 800 ft (243.8 m) of the proposed SR 7 extension footprint (P. Painter and S. Sneckenberger, Personal Communication 2014).

Snail kite nest surveys were also conducted by the FDOT's consultant on the project site and lands immediately adjacent to the project site footprint in October and November 2011, and March and April, 2012. During the 2011 survey, a snail kite was observed foraging and perching east of the project site near the northern end of the project corridor, in the vicinity of two snail kite nests documented in 2011 (Figure 6). During the 2012 snail kite survey, a male and female snail kite were observed near the intersection of the project right-of-way and M Canal, about 250 ft (76.2 m) east of the project footprint. The two snail kites were observed over several days using the same areas. Snail kites and snail kite nests were not observed within the project footprint during surveys of the project footprint conducted by the FDOT's consultant. However, apple snails were commonly observed within the project footprint. Although snail kites were not observed within the project footprint during surveys conducted by the FDOT, we believe it is likely snail kites use lands within the project footprint for feeding, perching, and roosting.

The Service believes the number of snail kites using the action area is likely greater than indicated by the nesting data. We note all of the snail kite nests constructed are usually not detected during a nest survey (Darby, 2012, Martin et al. 2007). Results from snail kite surveys conducted outside the breeding season also support the notion that the number of snail kites in the action area is greater than indicated by the nesting data. In 2011, 6 snail kite nests were observed during the nest survey of the GWP, but 20 to 40 birds were observed during subsequent surveys outside of the breeding season (P. Painter, Personal Communication 2012). Darby (2012) also reported that the number of snail kites recorded within the GWP is greater during the non-breeding season.

The use of the action area by the snail kite is expected to vary annually because movements of snail kites are dictated by weather, hydrological conditions, and apple snail availability (Darby 2012). Less use of the action area by the snail kite is expected in years where favorable environmental and hydrological conditions persist in other parts of snail kite's range. Conversely, snail kites are expected to occur within the action area in greater numbers in years where drought conditions prevail in other parts of the snail kite's range. The fact that waters within the GWP are managed to provide drinking water for the City of West Palm Beach means water levels suitable for apple snail production and feeding and nesting of snail kites are more likely to be maintained. Consequently, the action area is likely to serve as a critical refuge for the snail kite during periods of drought in other portions of its range (Darby 2012).

Factors affecting species environment within the action area

Factors that affect the Everglade snail kite within the action area include the presence of paved highways located immediately adjacent to the northern and southwestern portion of the action area and west of the PCNA (*i.e.*, State Road 710, Northlake Boulevard, and the existing portion of State Road 7 from Okeechobee Boulevard to 60th Street). Noise and light from motor vehicle traffic using these roadways and light from roadway lights could disturb snail kites in wetland areas adjacent to the roadway. The effect of roadway-related disturbance on snail kites is not known. However, snail kites may react to the disturbance by avoiding wetlands near the roadway. Moreover, snail kites flying in the roadway corridor could be struck by a motor vehicle and be either injured or killed. Bennetts et al. (1998b) reported motor vehicle collisions as a cause of mortality for the snail kite. However, the Service has not received any reports of snail kites being struck by vehicles along Northlake Boulevard and State Road 710 adjacent to the GWP.

Other activities within the action area have benefited the Everglade snail kite. Protection and long-term management of lands within the City of West Palm Beach's GWP and Palm Beach County's PCNA have conserved remaining habitat for the snail kite in a highly urbanized area. Moreover, management activities on these public lands, such as the eradication of exotic vegetation, have maintained quality habitat for snail kites.

Conversely, lack of adequate management of the GWP has the potential to adversely affect the snail kite by reducing the quality of the existing snail kite habitat. Due to the recent economic downturn and subsequent budget shortfalls, the City of West Palm Beach may not be able to adequately fund management activities at the GWP (P. Painter personal communication). The reduction or absence of critical management activities (*e.g.*, treatment of exotic and nuisance vegetation, etc.), can reduce the quality of habitat in the GWP for the snail kite and ultimately reduce snail kite productivity. The staff at the GWP is investigating ways to obtain sufficient funding to maintain adequate management at the GWP.

In addition, water management practices in the GWP also have the potential to adversely affect the Everglade snail kite. The water stored in the GWP comprises the water supply for the City of West Palm Beach. The City's current water supply targets are not always met during dry periods because the GWP is dependent on precipitation. In order to meet the projected public water supply needs through 2050, the City of West Palm Beach has proposed a new water management regime for the GWP. Water elevations would be increased from May 1 through November 1 to a maximum level of 18.2 to 18.5 ft (5.55 to 5.64 m) national geodetic vertical datum [NGVD], and reduced to no less than 17.8 ft (5.43 m) NGVD for the remainder of the year, with no scheduled dry downs. These changes in water management will result in more rapid fluctuations in water levels and storage of water at higher levels during the summer. High water levels reduce the abundance of emergent vegetation, a habitat substrate required by apple snails for egg laying and out-of-water respiration. Darby et al. (2005, 2009) note that high water levels during the apple snail breeding season reduces apple snail egg cluster production. Occasional drying events are also essential to allow emergent wetland vegetation to regenerate (Dineen 1974; Goodrick 1974; Zaffke 1983). The Service is concerned that the proposed water management regime has the potential to adversely affect the Everglade snail kite by reducing emergent wetland vegetation

and apple snail production. The Service submitted a Planning Aid Letter to the Corps on March 20, 2006, that provided the following recommendations which would reduce, but not totally eliminate, the impacts of the proposed water management strategy on the Everglade snail kite:

1) Modify the water level stages to insure apple snail reproduction and wading bird forage habitat is preserved by extending the low-water level period (17.8 ft [5.43 m] NGVD) to May 15;

2) Limit water level stage reversals to 0.25 ft (0.08 m) or less per month, year round, for wetland health, wood stork and other wading bird use, and maintenance of snail kite forage habitat; and

3) Initiate scheduled dry-downs to ensure surface elevations below 17 ft (5.18 m) NGVD are dry for no more than 30 consecutive days on a frequency of 6 to 10 years to maintain kite foraging habitat and natural community structure and function.

EFFECTS OF THE ACTION

This section analyzes the direct and indirect effects of the proposed action and any interrelated and independent actions on the Everglade snail kite and snail kite habitat.

Factors to be considered

Development projects may have a number of direct and indirect effects on the Everglade snail kite and snail kite habitat. Direct effects are primarily habitat based and include: (1) the permanent loss of habitat for snail kites and their prey; (2) a reduction in the geographic distribution of habitat for the species; and (3) harassment of snail kites due to construction activities. Indirect effects may include: (1) an increased risk of snail kite mortality from collisions with motor vehicles using the new roadway; and (2) increased disturbance to the snail kite in the project vicinity due to motor vehicle operations.

This project site contains snail kite habitat and is located within the geographic range of the Everglade snail kite. The timing of construction for this project, relative to sensitive periods of the snail kite's lifecycle, is unknown. Snail kites may be found on and adjacent to the proposed construction footprint year-round. The project will be constructed in a single, disruptive event, and result in permanent loss and alteration habitat on the project site. The time required to complete construction of the project is not known, but it is likely land clearing and fill placement associated with the development will be undertaken in a single phase at the start of development activities. The disturbance associated with the project will be permanent and result in a loss of habitat currently available to the snail kite.

Analyses for effects of the action

The proposed action will widen the existing SR 7 roadway from 2 lanes to 4 lanes from Okeechobee Boulevard to 60th Street and extend the SR 7 roadway from 60th Street to Northlake Boulevard in Palm Beach County, Florida (Figure 1). The 75.27-ac (30.46-ha) project footprint

consists of 67.43 ac (27.29 ha) of habitat types suitable for the Everglade snail kite. All lands within the 75.27-acre (30.46 ha) project footprint will be converted to paved roadway lanes and drainage features. The effects of the action are listed below.

Beneficial effects

Beneficial effects are those effects of the proposed action that are completely positive, without any adverse effects to the listed species or its critical habitat. The proposed action will not result in beneficial effects to the Everglade snail kite.

Direct effects

Direct effects are those effects that are caused by the proposed action, at the time of construction, are primarily habitat based, are reasonably certain to occur and include: (1) the permanent loss of snail kite habitat and habitat that supports snail kite prey; (2) a reduction in the geographic distribution of habitat for the species; and (3) harassment by construction activities.

Permanent Loss of Habitat for Snail Kites and their Prey: The site contains about 67.43 ac (27.29 ha) that provide habitat for the snail kite including 0.71 ac (0.29 ha) of pine flatwoods, 0.25 ac (0.1 ha) of canal, 4.77 ac (1.93 ha) of vegetated ditches, 14.31 ac (5.79 ha) of mixed wetland shrub, 22.52 ac (9.1 ha) of hydric pine flatwood, 11.31 ac (4.58 ha) of freshwater marsh, and 13.56 ac (5.49 ha) of vegetated berms. The freshwater marsh wetlands within the project footprint provide high quality habitat for apple snail production and snail kite foraging. Emergent vegetation in the littoral zones of the existing canals and water ditches, and shrub wetlands in the project footprint also provide lower quality habitat for apple snails and snail kite feeding. Wooded habitat types in the project footprint provide suitable perching, resting, and roosting sites for snail kites. Portions of the project footprint have been degraded through the past construction of berms, and canals, and through the invasion of exotic and nuisance vegetation (*e.g.,* Australian pine [*Casuarina equisetifolia*], melaleuca, Brazilian pepper, and cattail [*Typha domingensis*]). All the land in the project footprint will be converted to a paved roadway and drainage features and is no longer expected to be used by snail kites for feeding, roosting, perching, or nesting. Although the stormwater drainage ponds and swales constructed adjacent to the roadway may provide limited habitat for the apple snail, the Service believes it is unlikely that kites will forage in these areas due to the high frequency of disturbance from motor vehicles using the roadway.

A Reduction in the Geographic Distribution of Habitat for the Species: The project will directly result in the permanent loss of about 67.43 acres (27.29 ha) of habitat for the snail kite. This loss represents about 0.54 percent of the approximately 12,500 ac (5,059 ha) of wetlands in the action area. While the direct loss of 67.43 ac (27.29 ha) resulting from the project represents a small reduction in the overall geographic distribution of the Everglade snail range of wetlands in central and south Florida, this may be significant to kites in the action area if these wetlands are needed as a nesting refuge during any particular nesting season because climatic and hydrologic conditions in other parts of the range have rendered those wetlands unusable for that year.

Harassment by Construction Activities: The timing of construction for this project, relative to sensitive periods of the Everglade snail kite's lifecycle, is unknown. However, land clearing associated with the roadway construction will likely be completed in a few months. There are no known snail kite nest sites within the project footprint. The FDOT proposed to conduct surveys of the project footprint and lands up to 1,640 ft (499.9 m) from the project footprint from February through April immediately prior to and during construction. If an active snail kite nest is observed, the FDOT will direct the contractor to cease all construction activities within 1,640 ft (499.9 m) of the nest. The active nest will be monitored, and work will not resume within 1,640 feet (499.9 m) of the nest until: 1) the nestlings have been observed to fledge, or 2) the nest has failed and the adults are observed to leave the area.

Due to the vagility of the snail kite, it is unlikely that a snail kite would be struck by construction equipment. Therefore, we find it is unlikely project construction activities will result in direct snail kite mortality. However, noise from construction activities will likely cause snail kites to abandon the project footprint. In addition, noise and disturbance from construction activities may cause snail kites to avoid wetlands adjacent to the construction footprint during the construction activities, and could result in the temporary loss of snail kite habitat adjacent to the construction footprint.

Interrelated and interdependent actions

An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. Interrelated or interdependent actions are not expected to result from the project.

Indirect effects

Indirect effects are those effects that result from the proposed action, are later in time, and are reasonably certain to occur. The indirect effects this project will have on the Everglade snail kite within the action area are discussed below. They include: (1) risk of injury or mortality to snail kites flying within the new roadway corridor from collisions with motor vehicles using the new roadway; and (2) disturbance to snail kites in the project vicinity from motor vehicle traffic using the roadway and roadway lighting, and potential loss of habitat resulting from disturbance.

Risk of injury and mortality from collisions with motor vehicles: Motor vehicle traffic on the proposed new roadway extension represents a potential threat to the snail kite of injury or mortality resulting from a collision with a motor vehicle using the roadway. The projected motor vehicle traffic on the sections of widened and new four-lane roadway is not known, but is likely to be substantial because the project site is located immediately adjacent to a highly populated area. The posted speed limit of the road way will be 45 miles per hour. To date, the Service does not have any records of a snail kites being injured or killed due to a collision with a motor vehicles in the vicinity of GWP. But the Service finds it likely that presence of motor vehicles on the new paved traffic lanes will increase the potential for collisions with motor vehicles.

Disturbance to snail kites from motor vehicles using new roadway: The project will introduce a large amount of motor vehicle traffic into an area where it previously did not occur. Consequently, snail kites using wetlands adjacent to the project footprint will be exposed to increased noise from motor vehicles using the roadway. A motor vehicle traffic noise study was conducted by Siebein Associates (2012) to evaluate noise levels at the SR 7 project site and the adjacent GWP site based on current conditions and with projected motor vehicle traffic associated with construction of the SR 7 extension project. The existing ambient sound levels measured along the SR 7 project footprint were 37 to 38 decibels (dBA). The projected ambient sound levels of the motor vehicle traffic using the completed roadway extension, based on the FHWA's traffic noise model assuming 45 mile per hour vehicle speeds, were estimated at 52 to 57 dBA. Siebien Associates (2012) noted that the projected sound levels of the roadway exceed the noise threshold of 50 dBA reported in the literature as potentially affecting bird communication (Dooling and Popper, 2007). The noise study also determined that following construction of SR 7 extension project, a total of 600 ac (242.8 ha) of lands along the northern and western boundaries of the GWP will be exposed to traffic noise levels greater than 56 dBA, an increase of 420 ac (170 ha) compared to the current condition.

The effects of traffic noise on snail kites, as well as birds in general, are not well understood. Past studies indicate that traffic noise can affect birds (Warren et al. 2006). However, the results of these studies are likely confounded due to the effects of road-related variables other than highway noise (*e.g.*, visual stimuli, air pollution from motor vehicles, changes in the physical environment around the highway, etc.) (Dooling and Popper 2007, Warren et al. 2006, McClure et al. 2013). Recently, McClure et al. (2013) employed an experimental design to study the effects of traffic noise on bird abundance that avoided the confounding effects of roads. An array of speakers was used to apply traffic noise to a roadless area in southern Idaho, and daily surveys were conducted to assess bird abundance. McClure et al. (2013) observed a decline in bird abundance of greater than 25 percent and almost complete avoidance by some species at the site exposed to traffic noise compared to a control site. To our knowledge, there have been no studies that have specifically assessed the effects of road noise on the Everglade snail kite. Sykes et al. (1995) suggested motor vehicle noise may mask communication among snail kites. Sykes et al. (1995) described the characteristics of three different snail kite vocalizations, the most frequent described as a weak cackling note, and noted these vocalizations may not be audible over motor vehicle noise.

The SR 7 extension project will also introduce new sources of light (*i.e.*, lights from motor vehicles and roadway lights) into areas that are currently dark at night. The effect of these light sources to the snail kite is also unknown. Snail kites are thought to be active exclusively during daylight hours, and usually move into a roost area before or at sunset and spend the night at the roost. Although snail kite may change their perch location within the roost area during the night, they are not known to move significantly during darkness unless disturbed. Light from the project could cause snail kites to avoid roosting within suitable habitat near the roadway.

The Service finds it likely the disturbance resulting from the project (*i.e.*, traffic noise and lights from motor vehicles and roadway lighting) will cause snail kites to avoid the new roadway to some extent, and the project will indirectly result in loss of snail kite habitat outside of the project footprint. The Service notes it is difficult to quantify the loss of snail kite habitat in the action area due to

roadway disturbance. In lieu of any other available information, we used a GIS analysis to assess the effect of existing roadways adjacent to the action area containing at least four lanes (similar to the proposed project) on the location of snail kite nests in the action area. We reviewed our database for all records of snail kite nests in action area and determined the distance of each nest to the nearest roadway with at least four lanes. For the 46 records of snail kite nests within the action area, the closest distance of snail kite nest to a roadway with four or more lanes, Northlake Boulevard, was 814.8 ft (248.4 m). The results of our GIS analysis suggest that snail kites in the action area may not nest within approximately 800 ft (243.8 m) of a four-lane roadway. This distance can be used to estimate the amount of nesting habitat indirectly lost due to the project by determining the acreage of snail kite nesting habitat within 800 ft (243.8 m) of the construction footprint. Based on information on habitat types located within 800 ft (243.8 m) of the project footprint provided by the FDOT, the Service has determined up to 205.62 ac (83.2 ha) of snail kite nesting habitat adjacent to the project footprint in the action area could be indirectly lost due to the project. When considering the snail kite habitat directly loss due to the project as discussed above (67.43 ac [27.29 ha]), a total of up to 273.05 ac (205.62 ac + 67.43 ac = 273.05) or 110.49 ha (83.2 ha + 27.29 ha = 110.49 ha) of snail kite habitat could be lost due to the project.

Species response to the proposed action

The snail kite in Florida consists of a single population that relies on a series of wetland areas from Orlando southward to the Everglades, including the GWP within the action area. Impacts to one area must be assessed in conjunction with its effect on the entire snail kite population. Snail kites may not use wetlands within the action area every year. However, the action area, specifically the GWP, is an important refugium for the snail kite feeding and nesting when less favorable environmental and hydrologic conditions occur and the availability of apple snails is reduced in other parts of the snail kite's range. As indicated above, the project will result in a direct loss of snail kite habitat (67.43 ac [27.29 ha]) that provides foraging, roosting, and perching opportunities. The project could also indirectly result in the loss of snail kite habitat due to disturbance by motor vehicles using the completed roadway. As discussed above, the effects of disturbance on the snail kite are largely unknown, but snail kites will likely avoid foraging and nesting near the roadway. Consequently, the indirect loss of habitat to the snail kite may be significant (*i.e.*, up to 205.62 ac [83.2 ha]). The Service finds 273.05 ac (110.49 ha) of habitat lost due to the project is likely to reduce the reproductive productivity (*i.e.*, number of young produced) of the snail kite within the action area to some extent. However, a reduction in reproductive productivity may be difficult to detect. Because the snail kite population is dependent on all the wetland systems within its range, a reduction in reproductive productivity in the action area has the potential to reduce the reproductive productivity of the entire snail kite population.

CUMULATIVE EFFECTS

The Service defines "cumulative effects" considered in this Biological Opinion as the effects of future State, Tribal, local, or private actions (*i.e.*, non-Federal actions) reasonably certain to occur in the action area. Our definition of cumulative effects does not include future Federal actions unrelated to the proposed action because these actions require separate consultation pursuant to section 7 of the Act. The action area is defined as the project footprint and all lands

within the city of West Palm Beach's GWP and Palm Beach County's PCNA. Because the majority of the action area is protected for conservation purposes, cumulative effects are not expected to occur.

CONCLUSION

The construction and operation of the SR 7 extension project will result in habitat loss to the Everglade snail kite within the action area. The habitat lost due to the project has the potential to reduce the reproductive productivity of snail kites within the action area, and ultimately range wide. To help minimize the adverse effects of the project to the snail kite, the FDOT proposes to protect in perpetuity 219 ac (88.6 ha) of existing snail kite habitat within the Rangeline Corridors.

After reviewing the current status of the Everglade snail kite, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that construction and operation of the SR 7 Extension project, as proposed, is not likely to jeopardize the continued existence of the Everglade snail kite. Critical habitat has been designated for the Everglade snail kite; however, the SR 7 extension project is located outside of the designated critical habitat. Therefore, critical habitat will not be affected.

While the Service finds the project is unlikely to jeopardize the continued existence of the Everglade snail kite, based on the current small size of the snail kite population and the unknown, and potentially significant, effects of the project on the Everglade snail kite, the Service continues to urge the FDOT to eliminate the proposed corridor for the project and either adopt the "no build" alternative for the proposed roadway extension, or choose an alternative that does not impact the PCNA or GWP - such as an alignment west of the Ibis development. We also recommend the FDOT evaluate the feasibility of using mass transportation to solve this transportation issue.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct." "Harm" is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking, that is incidental to and not intended as part of the agency action, is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are nondiscretionary and must be undertaken by the FHWA so that they become binding conditions of any authorization, grant or permit issued to the FDOT, as appropriate, for the exemption in section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If the FHWA (1) fails to assume and implement the terms and conditions or (2) fails to require the FDOT, to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the authorization , permit or grant document, the protection coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the FHWA or the FDOT, must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

The Service has reviewed the biological information for the Everglade snail kite, information presented by the FDOT and the FDOT's consultant, and other available information relevant to this action. Incidental take of the Everglade snail kite in the form of harm (*i.e.*, the direct loss of 67.43 ac [27.29] of habitat in the 75.27-ac [30.46-ha] project footprint and the indirect loss of up to 205.62 ac [83.2 ha]) and harassment (*i.e.*, disturbance to any snail kites using the action area resulting from construction activities and motor vehicles using the completed roadway) is expected from the action. Take will be considered exceeded if impacts are found to be greater than the acreages shown above.

The Service has chosen not to quantify the level of incidental take in terms of a specific number of animals because documenting the adverse effects of loss of habitat and disturbance on survival and reproduction of snail kites from the project is problematic. We are choosing acres of habitat as a surrogate because these birds are wide-ranging, nesting and distribution vary greatly year to year, and the number of kites which may nest in this area varies due to environmental conditions. However, removing this acreage as a potential refugium during drought years would affect any kites seeking to use this habitat when other portions of their range are unavailable.

EFFECT OF THE TAKE

In the accompanying Biological Opinion, the Service determined this level of anticipated take is not likely to result in jeopardy to the Everglade snail kite. Critical habitat has been designated for the Everglade snail kite, but this project will not result in adverse modification of critical habitat for the Everglade snail kite.

REASONABLE AND PRUDENT MEASURES

When providing an incidental take statement, the Service is required to give reasonable and prudent measures it considers necessary and appropriate to minimize the take, along with terms and conditions, that must be complied with, to implement the reasonable and prudent measures. Furthermore, the Service must also specify procedures to be used to handle or dispose of any individuals taken. The Service finds the following reasonable and prudent measures are necessary and appropriate to reduce take and to minimize the direct and indirect effects of the proposed project on the Everglade snail kite:

1. Minimize the adverse effects of harm and harassment to the Everglade snail kite by implementing an appropriate habitat compensation plan.

2. Document the actual snai kitehabitat impacts post-project and monitor the level of wetland acres affected to determine if the acres of take have been exceeded.

3. Notify the Service of any unauthorized take of the Everglade snail kite in the form of an injured or killed snail kite.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the FHWA must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline reporting and monitoring requirements. These terms and conditions are non-discretionary.

1. Construction of the SR 7 Extension project will not begin until:

   a) The ownership of the parcels of land known as the "Rangeline Corridor from Okeechobee Boulevard to the M-Canal" (82.648 ac), "Rangeline Corridor from Northlake Boulevard to SR 710" (46 ac), and "Rangeline Corridor from SR 710 to Jupiter Farms" (90 ac) has been transferred to Palm Beach County's Environmental Resource Management. The ownership of 45.548 ac of the 90 ac in the Rangeline Corridor from SR 710 to Jupiter Farms had reverted back to the Florida Department of Environmental Protection (FDEP) per existing agreement with the FDOT. However, in an email dated June 10, 2014, the FDOT informed the Service that based on negotiations with the FDEP, ownership of the 45.548-ac parcel will be transferred to Palm Beach County Environmental Resources Management. The total acreage of land in the Rangeline Corridor converted for conservation purposes is 218.648 ac (rounded to 219 ac);

   b) The "Rangeline Corridor" parcels described in condition 1A are protected in perpetuity by conservation easement(s) with the Service listed on the easement(s) as having third party rights to enforce the easement(s) and enjoin activities that are not related to conservation;

   c) A copy of the signed conservation easements are provided to the Service;

   d) The FDOT and/or Palm Beach County provides an non-wasting endowment for the long-term maintenance and management of the three "Rangeline Corridors," of $1,166.00 per ac for a total endowment of $255,573.00 ($1,167.00 per ac x 219 ac = $255,573.00). The endowment is placed into an account created by the PBCBCC that specifically mandates that the funds will be used only for activities related to maintenance and management of the Rangeline Corridors discussed in condition 1A, and the account will be managed by Palm Beach County's Environmental Resources Management;

e) The FDOT, PBCBCC, or Palm Beach County's Environmental Resources Management provide proof to the Service in the form of a letter that the maintenance and management endowment of $255,573.00 has been provided and placed into the account created by the PBCBCC as described in condition 1D,and;

f) The Service notifies the FDOT and the FHWA by letter or email that they have received the signed conservation easement for the "Rangeline Corridor" parcels described in condition 1A that list the Service with third party rights, and proof that the maintenance and management non-wasting endowment of $255,573.00 has been provided and placed into the account created by the PBCBCC.

The FHWA/FDOT will: a) provide a final report, post-construction, with details on the actual direct impacts to snail kite habitat resulting from the construction of the project, b) fund the University of Florida's (or other entity or group acceptable to the Service) monitoring of snail kites and snail kite nests in the GWP for a period of 5 years following the completion of construction activities, and c) provide the results of the five years of snail kite post construction monitoring at the GWP in a report to the Service. The Service will use the results of the five years of post-construction monitoring of snail kites and snail kite nesting in the GWP to determine the extent of indirect wetland impacts to snail kites and to determine if take of snail kite habitat has been exceeded.

2. Upon locating a dead, injured, or sick threatened or endangered species, initial notification must be made to the nearest Service Law Enforcement Office; Fish and Wildlife Service; 1339 20th Street; Vero Beach, Florida 32960-3559 772-562-3909. Secondary notification should be made to the FWC; South Region; 8535 Northlake Boulevard; West Palm Beach, Florida; 33412; 561-625-5122.

3. Care should be taken in handling sick or injured specimens (of any federally listed species) to ensure effective treatment and care or in the handling of dead specimens to preserve biological material in the best possible state for later analysis as to the cause of death. In conjunction with the care of sick or injured individuals, or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service is not proposing any conservation recommendations at this time for the alignment as proposed; however, as stated above, the Service recommends reconsideration of alignments that are less impactful to listed wildlife and habitat.

REINITIATION NOTICE

This concludes formal consultation on the SR 7 extension project. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded (see below); (2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; (3) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. The amount of incidental take authorized by this consultation may be exceeded should impacts from the proposed project increase or mitigation fail to provide habitat values proposed and analyzed within this biological opinion. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for your cooperation in the effort to protect fish and wildlife resources. If you have any questions regarding this project, please contact John Wrublik at 772-469-4282.

Sincerely yours,

for Donald (Bob) Progulske
Everglades Program Supervisor
South Florida Ecological Services Office

cc: electronic only
Corps, Palm Beach Gardens, Florida (Garett Lips)
EPA, West Palm Beach, Florida (Richard Harvey)
FWC, Tallahassee, Florida (FWC-CPS)
NOAA Fisheries, West Palm Beach, Florida (Brandon Howard)
Service, Vero Beach, Florida (Heather Tipton, Sandra Sneckenberger)

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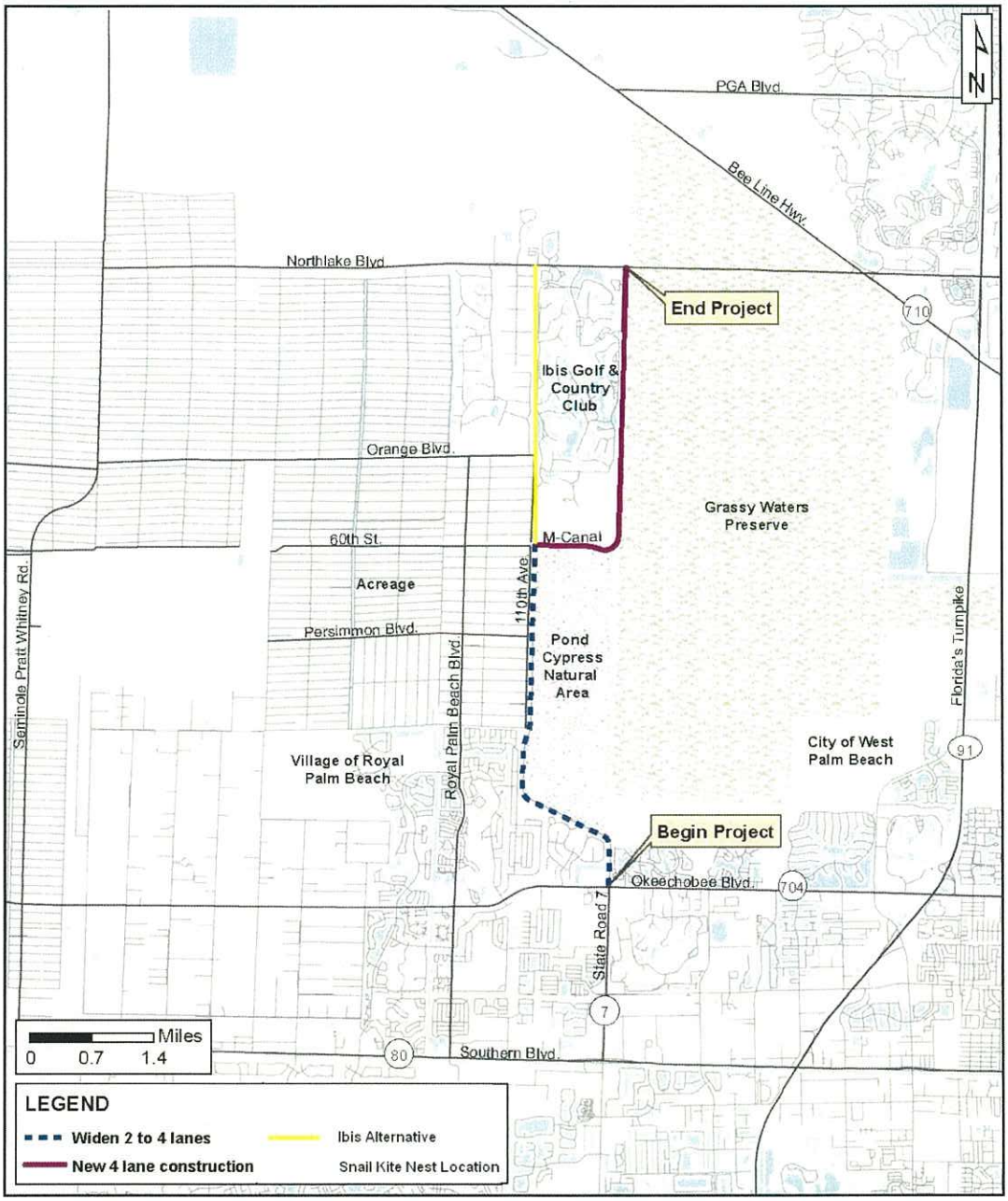

Figure 1. Location map of SR 7 extension project in Palm Beach County, Florida.

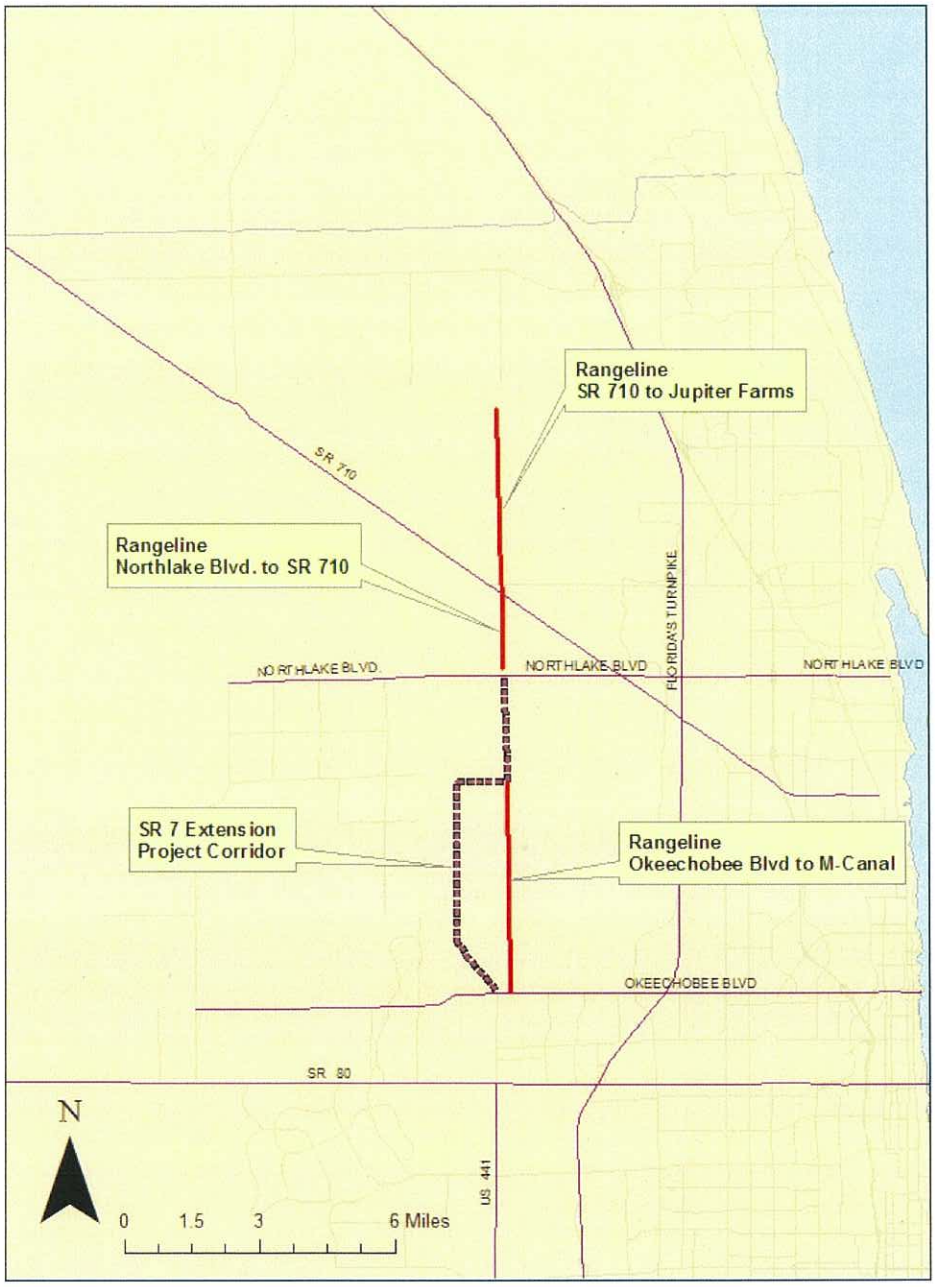

Figure 2. Location map of Rangeline Corridors from Okeechobee Blvd. to M-Canal, Northlake Blvd. to SR 710, and SR 710 to Jupiter Farms.

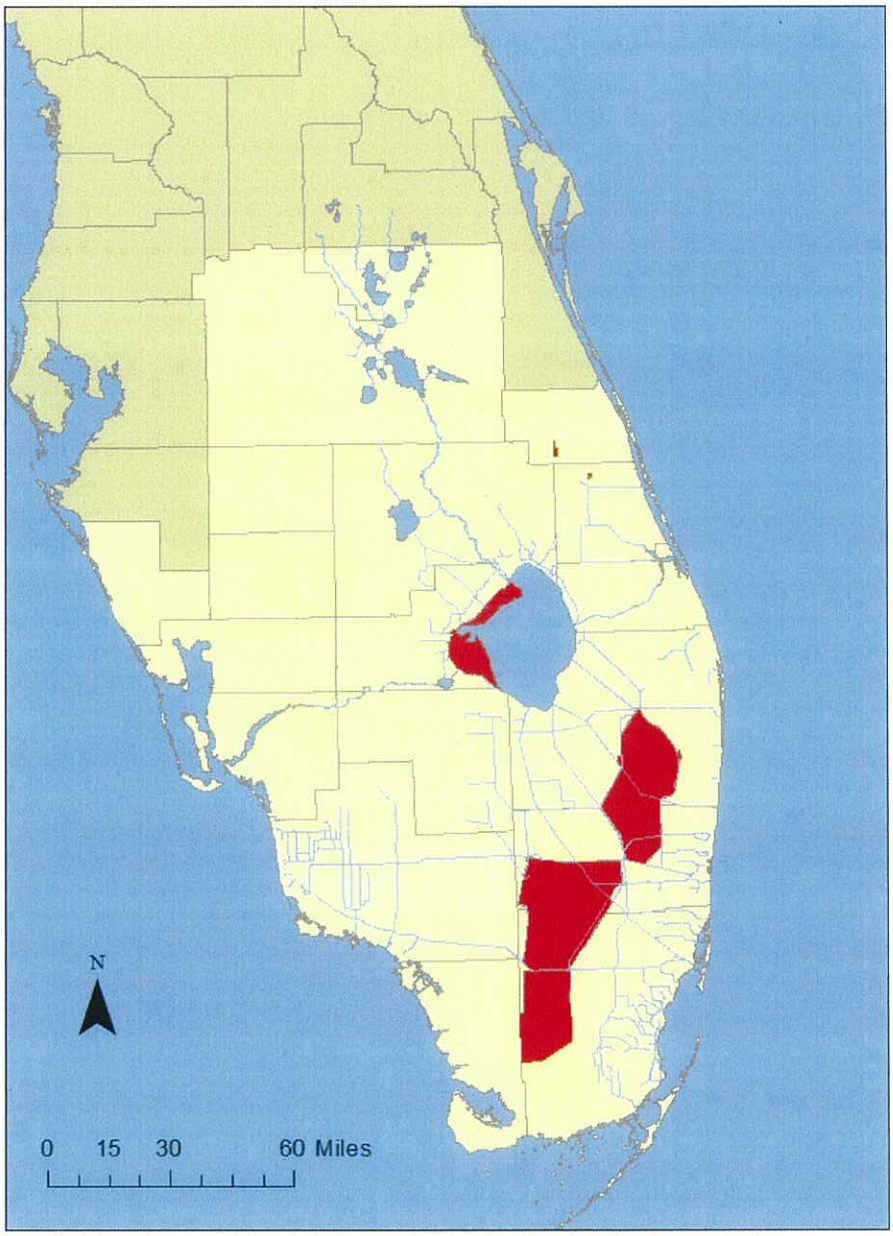

Figure 3. Map of Critical Habitat (areas shaded in red) designated for the Everglade snail kite in Florida.

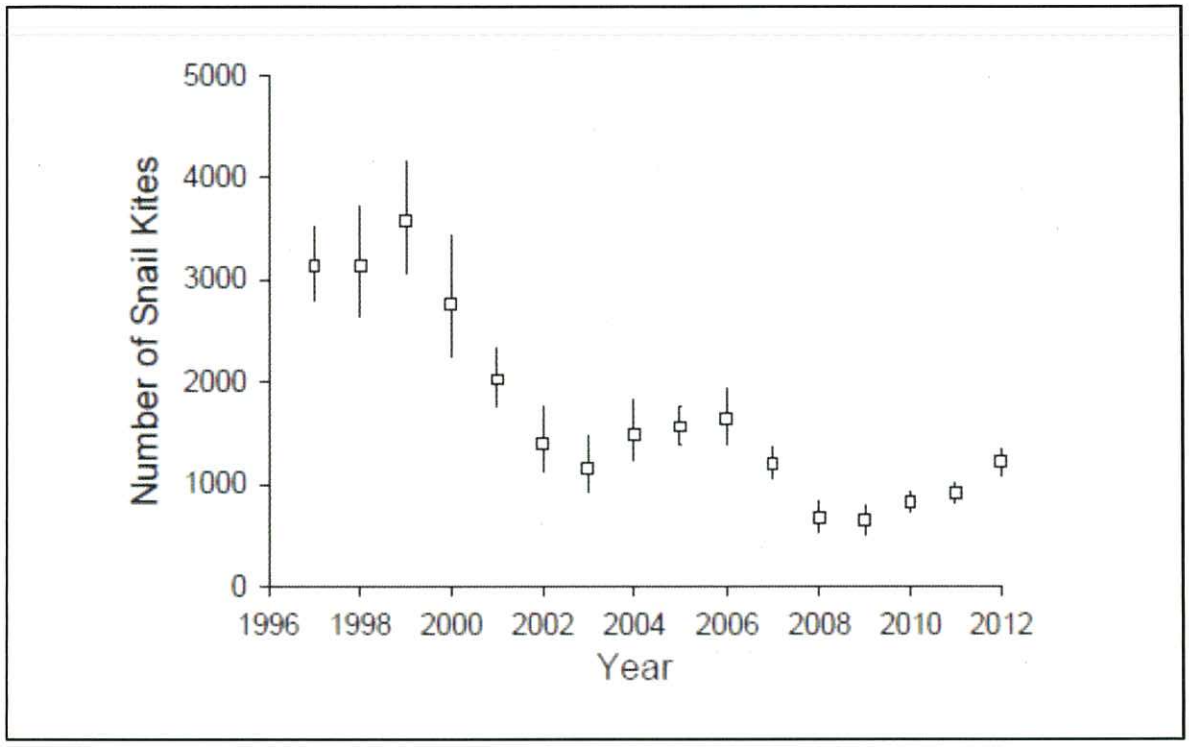

Figure 4. Estimated snail kite population size from 1997 through 2012 (Cattau et al. 2012).

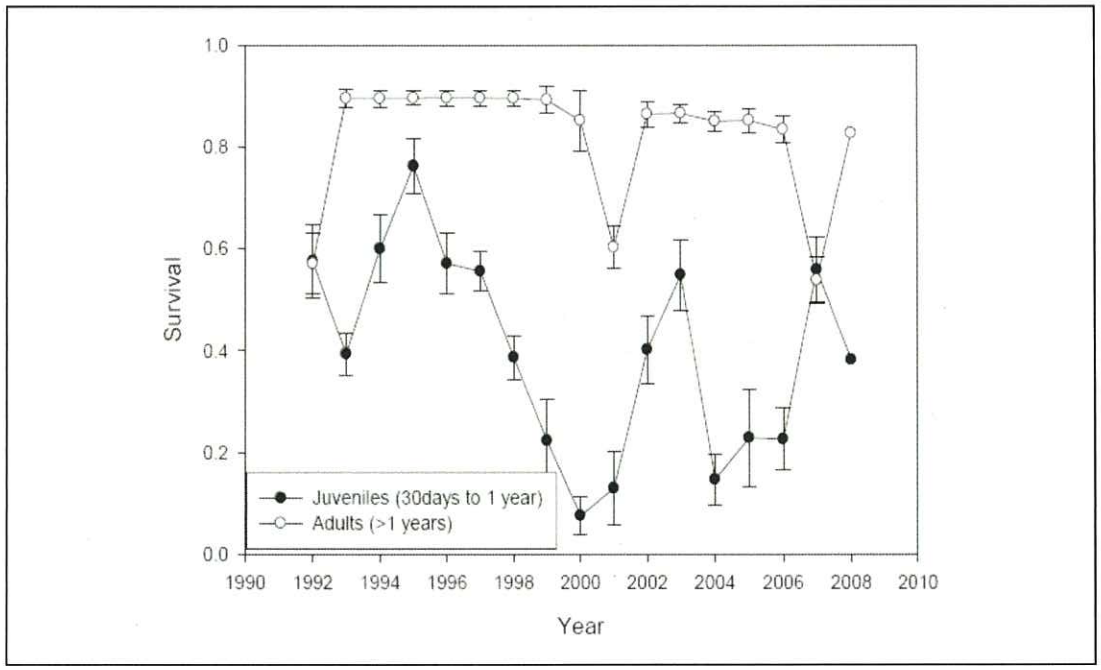

Figure 5. Model-averaged estimates of adult (white circles) and juvenile (black circles) survival from 1992 to 2008 (Cattau et al. 2009). Error bars correspond to 95 percent confidence intervals.

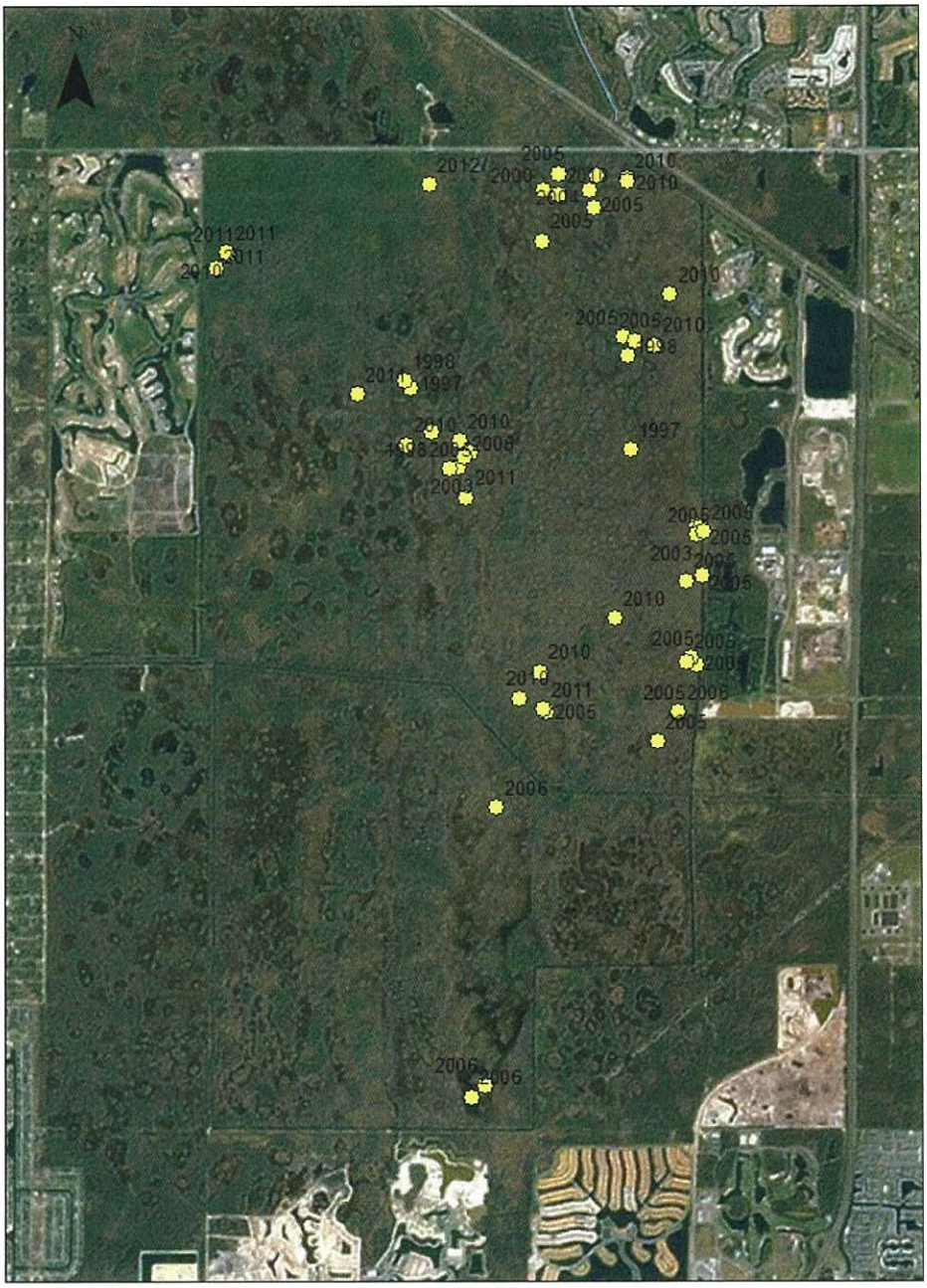

Figure 6. Map of snail kite nests within the Grassy Waters Preseve from 1997 – 2012.

Table 1. Everglade snail kite critical habitat units and acreage.

Critical Habitat Unit Description	**Acres**
St. Johns Reservoir, Indian River County	2,075
Cloud Lake and Strazzula Reservoirs, St. Lucie County	816
Western Lake Okeechobee, Glades and Hendry Counties	85,829
Loxahatchee NWR, Palm Beach County	140,108
WCA-2A, Palm Beach and Broward Counties	106,253
WCA-2B, Broward County	28,573
WCA-3A. Broward and Miami-Dade Counties	319,078
ENP, Miami-Dade County	158,903
Total	841,635